PERSONALITIES

By George F. Taubeneck

Real Cooperation

Within a few weeks the refrigeration industry will be presented with an official set of standards for rating commercial refrigerating equipment. That in itself is an important piece of news; but the story behind the news seems even more important to us.

It is a story of cooperation, of painstaking attention to details on the part of busy men, of the harmonious working together of competitors, of adherence to the highest standards of engineering and science.

Patiently for more than a year a joint committee of representatives from the American Society of Refrigerating Engineers, National Electrical Manufacturers Association, Refrigerating Machinery Association, Air Conditioner Manufacturers Association, and American Society of Heating and Ventilating Engineers have been conferring at stated intervals to devise and perfect this new rating scale.

GLENN MUFFLY, one of the industry's best-known and most respected engineers, has been the guiding spirit behind this monumental labor. To him and to his cohorts the entire industry owes a vote of thanks. That they might be given public recognition for their efforts, we asked Mr. Muffly to give us the names of the men who have worked with him on the project. Here they are:

For American Society of Refrigerating Engineers, 37 W. 39th St., New York City: *Glenn Muffly, chairman, 1827 Stratford Pl., Springfield, Ohio; Frank Zumbro, Frick Co., Waynesboro, Pa.; W. R. Woolrich, Tennessee Valley Authority, Knoxville, Tenn.

For Refrigerating Machinery Association, Southern Bldg., Washington, D. C.: †L. S. Morse, chairman, York Ice Machinery Corp., York, Pa.; A. H. Baer, Carbondale Machine Corp., Harrison, N. J.; W. H. Carrier, Carrier Corp., Newark.

For National Electrical Manufacturers Association, 155 E. 44th St., New York City (Refrigeration Division, Penobscot Bldg., Detroit): †H. M. Williams, chairman, Frigidaire Corp., Dayton; Chester Lichtenberg, General Electric Co., Fort Wayne, Ind.; L. A. Philipp, Kelvinator Corp., Detroit.

For Air Conditioner Manufacturers Association, 330 W. 42nd St., New York City: D. E. French, chairman, Carrier Corp., Newark; †L. S. Morse, York Ice Machinery Corp., York, Pa.; †H. M. Williams, Frigidaire Corp., Dayton.

For American Society of Heating & Ventilating Engineers, 51 Madison Ave., New York City: W. E. Stark, Bryant Heater & Mfg. Co., Cleveland; F. H. Faust, General Electric Co., Schenectady; C. W. Walton, Jr., Rockefeller Center, Inc., New York City.

*Also on Nema sub-committee at start.

†Representing two organizations.

Former members, alternates, and guests who have assisted the Joint Committee in its work:

‡John Wyllie, Jr., active in promoting idea that new standard was needed, and for a time a Nema representative on the Joint Committee.

‡Dr. J. B. Churchill (deceased) original A.S.R.E. committee, replaced by Mr. Zumbro.

F. E. Dennison (RMA) replaced by Mr. Erbach.

Fred R. Erbach (RMA), replaced by Mr. Morse.

‡R. G. Ewer, alternate for Mr. Baer.

T. E. Carpenter, alternate for Mr. Baer.

‡R. E. Robillard, alternate for Mr. Williams.

‡J. L. Gibson, alternate for Mr. Williams.

M. W. Baker, guest with Mr. Williams.

J. E. Linebaugh, guest with Mr. Williams.

‡W. E. Zeiber, guest with Mr. Morse.

J. G. Bergdoll, Jr., guest with Mr. Morse.

L. Williams, guest with Mr. Morse.

‡H. A. Whitesel, guest with Mr. Lichtenberg.

‡W. L. Knaus, guest with Mr. Lichtenberg.

‡W. A. Grant, guest with Mr. French.

W. F. Jones, guest with Mr. French.

John James, guest, A.S.H.V.E. headquarters, New York City.

W. M. Timmerman, guest, General Electric Co., Cleveland.

E. R. Wolfert, guest, Westinghouse Electric & Mfg. Co., Springfield, Mass.

David L. Fiske, secretary, A.S.R.E., New York City.

‡Attended many meetings and did considerable of the work.

* * *

Japan Interested

Modeled after the Westinghouse "Home of Tomorrow," the "House of Electricity," built and installed by Mitsubishi Denki K. K., has been completed and made ready for demonstration in Japan, some of our Westinghouse friends tell us. They believe that this may be the starting wedge in a Japanese drive toward modern housing.

This "House of Electricity" adapts modern electrical conveniences to the eastern mode of living. Electric heating and a Westinghouse air-conditioning system are installed in the house.

Copied from the all-electric kitchen in "Home of Tomorrow," the kitchen in this home has a Westinghouse automatic range, refrigerator, coffee percolator, toaster, sandwich grill, hotplate, tea kettle, and rice cooker. The house has outside telephone connections for each room, and an interroom microphone and loudspeaker system.

Construction of this house was planned after members of this company heard C. E. SKINNER, formerly assistant director of engineering at Westinghouse Electric & Mfg. Co., and president of the American Institute of Electrical Engineers, speak on the "Home of Tomorrow," at a meeting of electrical men in Japan.

* * *

In China, Too

A reader who has become interested in the editor's proposed trip around the world writes that a Sunbeam air-conditioning unit, made by the Fox Furnace Co., Elyria, Ohio, a division of American Radiator & Standard Sanitary Corp. is to be installed in the library of SUN FO, President of the Legislative Yuan of China, located in Nanking.

The President of the Chinese Yuan corresponds to the presiding officer of our Senate.

Cooling equipment will be connected to the Sunbeam unit, so that the complete system will provide year-'round air conditioning.

Much interest is being shown in modern air conditioning by the wealthier Chinese, especially in the larger cities which have the same extremes of temperatures that are encountered in the northern section of the United States.

* * *

Success Story

Little mistakes sometimes lead to rather significant disclosures.

Back in mid-October, the NEWS chronicled the appointment of HOWARD B. BARBER as manager of the major electrical appliance division of Montgomery Ward & Co., succeeding VANCE WOODCOX when the latter left to join Geyer, Cornell & Newell agency.

In reporting the incident, we said that Mr. Barber, who had been manager of Kelvinator's New York branch, had previously been manager of the company's branch office here in Detroit.

This was true, as far as it went—but what we missed, and what we'll bet a lot of our readers will be interested in knowing, is his steady march upward, from domestic refrigerator salesman in Kelvinator's Detroit branch to his present position.

Here, then, are the facts on Mr. Barber's rise—facts which should prove an inspiration to every salesman in the industry:

April 1 to Sept. 1, 1926: domestic salesman, Detroit Kelvinator branch.

Sept. 1 to Jan. 1, 1927: head of the builders' department, Detroit branch.

Jan. 1 to April, 1927: manager, Detroit branch.

April to October, 1927: district manager, Michigan and northern Ohio territory, Kelvinator.

October, 1927, to October, 1929: sales manager, Dalrymple Kelvinator Co., Detroit.

October, 1929, to May, 1932: manager, Detroit branch.

May, 1932, to October, 1935: branch manager, New York Kelvinator branch.

December, 1932, to October, 1935: chairman of the New York Refrigerator Association, Inc. (in addition to branch manager duties).

Which would seem to indicate that a young man can make a place for himself in the refrigeration industry—if he delivers.

Up from the Ranks

Howard B. Barber, Montgomery Ward appliance division manager.

Hill-Top Bi-Weekly

Last year we called to your attention the neighborhood newspaper being edited and published by the very-young-indeed son of TERRY TERHUNE, New England district commercial sales supervisor for Servel. Terry, Jr., has plenty of the earmarks of the born newspaperman, and he isn't wasting any time seeking expression of this talent.

A few days ago Terry, Jr., sent us copies of his new paper, the *Hill-Top Bi-Weekly* of Swampscott, Mass.

Copiously illustrated with drawings (including some very creditable comic strips) by young Mr. Terhune and his co-publisher, BILL BURT, this mimeographed eight-page paper has everything from neighborhood news to a considerable volume of paid (10 cents to 25 cents per) advertising, which the publishers offer to embellish with "free-hand drawing if wanted."

Among the items, we found this: "Mrs. Ford has a new Plymouth car."

Also, in a report of a local football game, this record of a strange accident: "Late in the fourth quarter the quarterback of the Otis Club Team was carried off the playing field with a bad injury, sustained after he had tried to kick the ball from his own territory, his foot missing the ball and getting thrown out of joint."

The publisher interviews his mother: "Mrs. E. A. TERHUNE made a trip to the metropolis of New York a week ago. She made the entire trip to New York by air and returning with her husband by automobile. She said, when interviewed by the staff reporter, that she enjoyed every inch of the trip both to and from the large city."

That, we claim, is a model of objective reporting.

However, sentiment gets the better of the reporting instinct when young Terry writes: "Mrs. E. A. Terhune celebrated her birthday a short time ago," without saying *what* birthday.

Most of all, though, we were pleased with the following statement of principles:

"This newspaper is a private enterprise and not a paper sponsored by any club or any school. We print nothing but straight facts. If at any time we do make an error of any kind we wish to have you call it to our attention."

If Terry, Jr., succeeds in following these cardinal journalistic principles all his life, he should be a success, no matter on what scale he aspires to build his career.

* * *

Practical Suggestion

JOHN H. VAN DE VENTER, writing in *The Iron Age* for Nov. 14, 1935, presents a very practical idea for the consideration of Mr. Roosevelt and the New Deal:

"Here is food for thought for the wealth sharers and also for the people who elected them to office.

"During the 10 years from 1924 to 1933, the half million incorporated businesses in the United States reported collective net income averaging a little under 3½ billion dollars per year. It is a fair average to take for our purpose, since six of these 10 years fell in the boom period.

"If these profits had been conscripted and divided among our forty million gainfully employed people, it would have raised each one's wages just $87.50 per year. Figure it out for yourself.

"That is one way to share wealth. But it would mean adopting state socialism or communism, junking the Constitution, and regimenting everybody under a gang of political bosses.

"There *was* a practical and much more simple way to achieve much greater wealth sharing. The practical men who built the Democratic platform knew that way and made it plain in pledging a 25 per cent reduction in cost of Government. Believe it or not, if that pledge had been kept we would have saved enough to raise the wages of our 40,000,000 workers $142½ each per year.

"Five and three quarter billion dollars would have been available to divide if we had cut 25 per cent from the $13.4 billion cost of Government, as it was in 1932 when that pledge was made, and had held it there. For that is the difference between the total cost of Government, Federal, State, and local as it is running now and as it would have been now if we were operating at a rate 25 per cent below the 1932 level.

"$142.50 more per year is a nice sum in anybody's pocket and how it would increase the 'capacity to consume' that the professors talk about!

"This is a practical form of wealth sharing that can be put into effect without revolution, without regimentation, without bullets, but simply through ballots. American citizens should give it considerable thought."

* * *

Air-Conditioned Cars

Practical installation of air-conditioning or refrigerating equipment in automobiles is perhaps some way off, but F. A. HERKINS of Belleville, N. J., sent a letter to the Kelvinator branch manager in New York City which tells of an interesting experience in that connection. The letter follows:

"I have just finished a twelve thousand mile auto trip to the West Coast. On the way out, along the Columbia River Highway, my front license plate was blown off.

"At Gold Beach, Oregon, a local painter painted a duplicate for me on the reverse side of an enamel sign reading: 'Equipped with Kelvinator.'

"When I came out of a restaurant in Eureka, California, I found that a crowd had collected around the car.

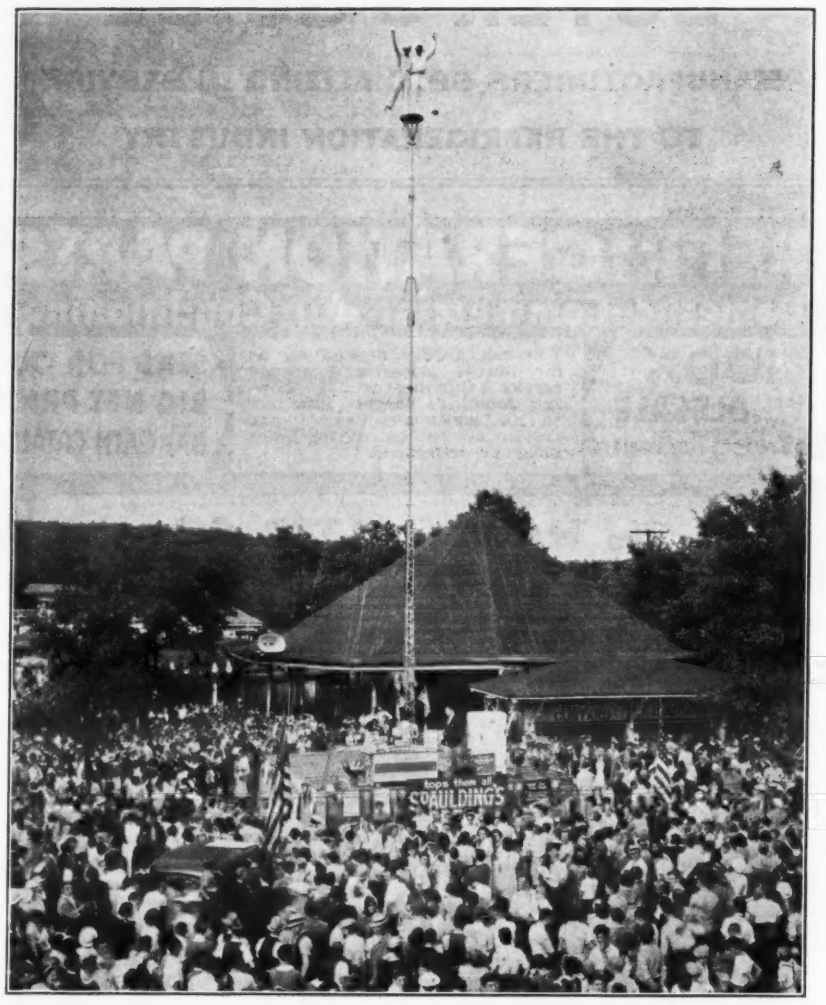
"They were looking first at the sign and then inside the car.

"The same thing happened wherever I went; Los Angeles, San Francisco, Seattle, Portland, Chicago, etc.

"In Frisco the crowd was so large I was asked to move the car. Dozens upon dozens of motorists, traffic policemen—even garage attendants, looked with interest at the sign. Many asked to see the equipment.

"I am writing this, not to advise you of the free advertising I have given you, but, with the memory of crossing Kansas with the thermometer at 116°, why not a passenger car 'Equipped with Kelvinator?' Just a thought for the future."

Promotion Stunt Attracts 35,000

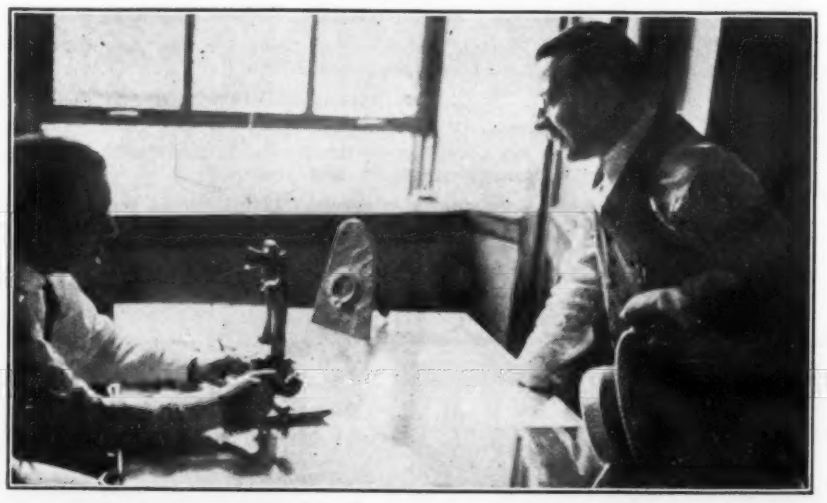


Two aerial dancers, performing on an 18-inch disc 100 feet in the air, attracted 35,000 people to a Westinghouse promotion stunt in Scranton, Pa., in connection with a Westinghouse feature popularity contest.

'Now, You Hook the Valve on—'

Dan Wile, head of Detroit Lubricator's accessories laboratory, answers a question in regard to the proper application of thermostatic expansion valves and then listens as another is asked.

Plan 'Sav-a-Step' Presentation



Charles D'Olive, Stewart-Warner refrigeration executive, discusses plans for merchandising the 1936 refrigerator line featuring the "Sav-a-Step."

THE NEWSPAPER OF THE INDUSTRY

ELECTRIC REFRIGERATION NEWS

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Nema & Utilities To Cooperate in Kitchen Bureau

Promotion of Refrigerators, Ranges, Other Appliances Planned by Bureau

NEW YORK CITY—National Electrical Manufacturers Association and Edison Electric Institute have joined together to organize the National Kitchen Modernizing Bureau, to promote the sale of electric refrigerators, ranges, water heaters, and other kitchen appliances.

Participation in the program will be limited, as far as possible, to Nema member companies, who are subscribing $52,000 to cover the national phases of the activity. Only the products of contributing manufacturers will be included in the national advertising campaign, which will be an important part of the Bureau's work.

Major part of the Nema fund will be provided by the Household Refrigeration Division, Electric Range Section, and Electric Water Heating Section, since these will be the greatest immediate beneficiaries from the activity.

Manufacturers of wire and wiring devices, transformers, meters, lighting equipment, ventilating fans, dishwashers, and other products will also benefit from the program, and will contribute a portion of its financing.

The program, it is believed, will give Nema members their first opportunity to present a united front

(*Concluded on Page 6, Column 5*)

News Editor to Talk At World Congress

NEW YORK CITY—George F. Taubeneck, editor of ELECTRIC REFRIGERATION NEWS, has been selected to present a paper on the development of the electric refrigeration industry before the World Congress on Refrigeration, which meets at The Hague, Holland, June 14-19, 1936, according to Gardner Poole, chairman of the American delegation.

Mr. Poole, who is executive vice president of the Birdseye Packing Co., quick-frozen foods division of the General Foods Co., expects to head a delegation of more than 20 United States refrigeration men to the Congress next spring.

Willis Carrier, president of Carrier Corp. will also present a paper at the Congress, as has been previously announced.

10% Reduction in Canadian Tariff Effective Jan. 1

WASHINGTON, D. C.—After Jan. 1, 1936, the duty on American-manufactured electric refrigeration equipment exported to Canada will be reduced from 40% to 30%, according to terms of the trade agreement between the two countries, signed last month. Both household and commercial units are included in the reduction.

The agreement will continue until Dec. 31, 1938, with automatic extensions thereof unless either government gives six months' notice of termination.

Besides refrigerators, several other electrical appliances were affected by the agreement. These include washing machines, on which the duty is dropped from 35% to 25%; apparatus for cooking or for heating buildings, for electricity or oil, which drop from 30% to 25%; radios, which drop from 30% to 25%; and all machinery composed wholly or in part of iron or steel (not otherwise provided for in the tariff), of a class or kind not made in Canada, with complete parts, which drop from 35% to 20%.

Refrigeration equipment is given its reduction in duty under the "most-favored-foreign-nation" treatment, without assurance, however, that this rate may not be increased. In the other cases, the reductions in duty are bound against increase during the life of the agreement.

Concessions made to Canada by the United States, under the American

(*Concluded on Page 6, Column 4*)

Norge Distributors Are Holding Convention in Detroit This Week

DETROIT—Norge distributors from all parts of the country, about 200 in number, are in Detroit this week for their annual meeting with Norge Corp. executives.

The meetings, which opened Monday to continue through Thursday, are being held at the Players' Club, Cosmopolitan Club, and Detroit-Leland hotel.

The 1936 line of Norge refrigerators and other products will be shown at the convention, and sales and advertising plans for the coming year will be discussed by President Howard E. Blood, Vice President in Charges of Sales John Knapp, Sales Promotion Manager James E. Sterling, and other Norge officials.

Report on the meeting will be carried in next week's issue of ELECTRIC REFRIGERATION NEWS.

Morse to Head A.S.R.E.; Vote Upsets Tradition

Air Conditioning Is Main Theme of Convention, Held in New York

By George F. Taubeneck

NEW YORK CITY—In the first electoral upset of its tranquil and serene history, the American Society of Refrigerating Engineers elected L. S. Morse, executive engineer of the York Ice Machinery Corp., president of the national organization at its thirty-first annual meeting, held Dec. 4, 5, and 6 in the Hotel Pennsylvania here.

Previously the first vice president of the society automatically is elected president at the beginning of the new year. The second vice president becomes first vice president, from which position he, in turn, ascends to the presidency the following year.

Mr. Morse was neither first nor second vice president, although he had been a member of the council for some years. His election was said to be in part a recognition of his signal contributions to the science of refrigeration during the past several years, and in part a matter of faith in his executive abilities.

Society members declared that S. C. Bloom of Chicago, the first vice president who would normally have been elected, would have been unable to devote sufficient time to the duties of the presidency.

Air conditioning was the big theme of the convention. At the opening session, "Technical Aspects of Air

(*Concluded on Page 6, Column 3*)

G-E Distributors at Sales Conference

CLEVELAND—Distributors of General Electric refrigerators, ranges, dishwashers, laundry equipment, and other home appliances attended the tenth annual winter sales conference of G-E's specialty appliance sales division at Nela Park this week.

Company officials on the program included C. E. Wilson, vice president in charge of all appliance activities; P. B. Zimmerman, general sales manager of the appliance and merchandising department; G. J. Chapman, manager of the specialty appliance sales division; R. J. Cordiner, manager of the radio sales division; D. C. Spooner, Jr., manager of the home laundry equipment and cleaner sales division, and R. W. Turnbull, manager of the traffic appliance sales division.

A. M. Sweeney, sales manager of the specialty appliance sales division, was chairman of the convention. The complete line of G-E home appliances was previewed by distributors, preparatory to a series of 55 previews in as many cities from Dec. 16 to Jan. 16.

Charles Steenstrup and T. K. Quinn, former G-E vice president and now president of Maxon, Inc., were other speakers at convention sessions.

EH&FA Plan Extension Awaits Appointment Of Utility Agents

By Phil B. Redeker

WASHINGTON, D. C., Dec. 7—The Electric Home and Farm Authority's plan for low-cost financing of electric refrigerators and other electrical appliances will be extended to various parts of the country just as soon as power companies sign up as agents to bill and collect accounts, George Munger, commercial manager of the EH&FA, said here today.

The plan will be extended only to those areas where the rates come within the limits set by the EH&FA, Mr. Munger explained. EH&FA has been approached by a number of utility companies, both public and private, and a number of contracts will probably be announced in the near future, Mr. Munger stated.

Just approved by the EH&FA for financing under its plan are several new types of appliances, including washers, ironers, vacuum cleaners, milk coolers, cream separators, and farm motors.

These are in addition to the original

(*Concluded on Page 6, Column 2*)

FHA Will Investigate Violations of Housing Act Terms by Dealers

Government Does Not Plan to Compete with Dealers In Marketing Repossessed Refrigerators

By Phil B. Redeker

WASHINGTON, D. C.—Flagrant violations of the terms of the National Housing Act will be investigated by the Federal Housing Administration and will be prosecuted by the U. S. Department of Justice.

The FHA has no plans or intentions of competing with retailers of electric refrigerators.

These were the outstanding points made by officials of both the FHA main office and the collections division at "off the record" interviews last Friday with the writer. The "off the record" manner of the interviews (which simply means that those speaking will not allow themselves to be quoted or made authority for the statements made) was made necessary, said the officials, because of a "major change in our collection policy now taking place."

Other points of interest made during the interviews were:

(1) The policy on collections and repossessions will not involve the dumping of repossessed refrigerators on the market at a price at which private dealers would be undersold.

(2) The charge made by a speaker at the recent ice industry convention that the government intends to buy a large plant in the East and manufacture refrigerators to be sold under FHA terms was branded the "darndest fairy story ever propagated."

(3) The FHA does not see why it should be involved by the cries from other industries that too great a share of the loan volume is going for refrigerators. It is felt that the matter is one of public preference for a certain type of article plus the factor of aggressive selling efforts on the part of refrigerator dealers.

(4) The FHA is apparently depending on pressure from industries benefitting by Title I of the National Housing Act to extend the act after its date of expiration, April 1. An act of Congress is necessary to extend the program.

Of the first 1,000 complaints of alleged violations of the terms of the FHA, approximately 10% involved sales of electric refrigerators, officials declared.

Most of the alleged violations of the act, say officials here, grew out of efforts of dealers to obtain business under FHA loans through a misrepresentation to the customer; or through

(*Concluded on Page 4, Column 1*)

Refrigerant Issue Fizzles Out at N. Y. Hearing

By Phil B. Redeker

NEW YORK CITY—In an atmosphere tense with expectancy because of a sensational news story in the previous day's issue of the *New York World-Telegram* which asserted that passage of the ordinance would give the du Pont interests "an effective monopoly" on the air-conditioning business, hearings on the proposed local code relating to refrigerating systems opened last Thursday in the Municipal building before a cross-section of the air-conditioning industry, and representatives of users and prospective users of systems.

The refrigerant issue proved to be considerable of a fizzle at the opening hearing, despite the pointed efforts of Deputy Fire Commissioner F. X. Giaccone, conducting the hearings, to invoke discussion on the subject from any interested parties. The Commissioner (who had evidently read the *World-Telegram* story) got right to the subject at the start of the hearing, and repeatedly asked for objections and suggestions concerning the provisions of the proposed code which deal with refrigerants.

At the conclusion of the session, the commissioner asked that anyone who could advance arguments that any refrigerants that were suitable for air conditioning and not so designated in the present draft of the code to do so at the next hearing, scheduled for this Wednesday, Dec. 11.

The rumor circulated in informal discussion following the close of the

(*Concluded on Page 2, Column 3*)

Air-Conditioning Installations for 9 Mos. In Washington, Chicago, Rochester & Baltimore Are Over '34 Total

Evidence that air conditioning is leaving behind its "summer cooling" phase and is rapidly becoming an all-year-around business is contained in reports of five large-city installations for the first nine months of 1935, compiled by ELECTRIC REFRIGERATION NEWS with the cooperation of public utility companies.

The cities are Washington, D. C., Philadelphia, Baltimore, Rochester, N. Y., and Chicago.

132 Sold in Washington

Probably the most notable increase during the first nine months of the year was recorded in Washington, where installations totaling 132 were reported, as compared with 140 in all years previous. This figure is exclusive of installations in Federal Government buildings, of which there were 19.

In the individual fields, the best gains were recorded in private offices and residences in the city. Residential air conditioning jumped from 24, its previous mark, to 59, an increase of 35 installations, totaling about 48 hp. Private office applications totaled 20 for the period, bringing the city's total to 37.

Notable also was the conditioning of two large office buildings, for a total of 635 hp.

Active season started early in the year, reports J. P. Schaefer of the commercial engineering department of Potomac Electric Power Co. During the first four months of 1935, more horsepower had been installed than during the whole of 1934.

This was principally due to a large department store installation, which totaled 729 hp. During the period, however, 27 installations were made in the city, as compared with 13 for the same four months of 1934, indicating Mr. Schaefer thinks, that air conditioning is ceasing to be a late spring and early summer business, and is developing into a year-'round activity.

Interest in residential air conditioning, and especially in the speculative field, is growing rapidly in Washington, Mr. Schaefer reports.

Sales promotional activities were not carried on over-actively during the first three-quarters of the year, Mr. Schaefer says, but a sustained program is planned for the start of 1936. This, it is expected, will increase the total horsepower by about 130 per cent over the 1935 total.

Chicago Total Is 297

Installations in Chicago proper for the first nine months of the year were 297, for a horsepower of 5,246, bringing the city's total to 915 installations, with 47,334 hp. load.

Most striking progress made in the city this year, according to Knight C. Porter of the air-conditioning division of Commonwealth Edison Co. is in the small commercial business classifications.

Beauty shops, candy stores, drug

(*Concluded on Page 12, Column 1*)

October Sales of Household Refrigerators To Dealers Hold Up and Push 10-Month Industry Total near 1,600,000 Mark

DETROIT—World sales of household electric refrigerators by manufacturers to distributor and dealer outlets during October amounted to 56,690 units, to bring the total for the first 10 months of the year to 1,586,242 units, according to an estimate by ELECTRIC REFRIGERATION NEWS.

October sales figures represent an increase of 15,890 over the 1934 mark for the month, in which 42,800 unit sales by manufacturers were recorded. Last year, the October sales total was the lowest in five years, with the exception of 1932, when but 34,100 sales were made.

A tabulated report of Nema sales for October and names of reporting companies appears on page 8 of this issue.

Sales for the month held up unusually well, being only 7,162 below the September total of 63,852 units.

World shipments of household refrigerators during October, as reported by 14 member companies of the Household Refrigeration Section of National Electrical Manufacturers Association (Nema), totaled 51,588 units.

For the 10 months of 1935, Nema member companies have sold 1,443,645 units, an increase of 280,816 over the 1,162,829 reported sold during the same period of last year.

At the same time, total estimated industry sales have risen 270,842 above the 1,315,400 calculated for the months through October, 1934.

This year's sales figures, as estimated for the first 10 months, are 195,642 above the 1,390,600 units which represented the industry's sales for the whole of last year. The 1934 record, a new high for the industry, was passed as early as August, when sales zoomed to 1,465,700 units for the first eight months of the year.

Reports from 19 member companies of the Commercial Refrigeration Section of National Electrical Manufacturers Association showed world sales of commercial condensing units by these companies during October to total 6,350 units, a gain of 379 over the 5,971 unit sales reported by the same companies for September.

In the sales-by-states tabulation of shipments to distributors and dealers, New York maintained its commanding lead, figures for the month in that territory totaling approximately 20 per cent of all refrigerators shipped. Of 39,737 shipped in the United States, New York's total was 7,326.

California was second with 4,968, Pennsylvania third with 4,234.

Foreign household electric refrigerator shipments showed an increase for the month, totaling 11,345.

You'll See Soon—
WATCH FOR ANNOUNCEMENT
Biggest Refrigeration Sales Feature for 1936

STEWART-WARNER

Engineers Argue on Definitions At Opening Hearing on New York City Code

(Concluded from Page 1, Column 4)

session was that the refrigerant issue would be threshed out at this Wednesday's session, but that the issue would be predicated on whether or not refrigerants classified as irritant and flammable can be used in the "indirect open spray method of refrigeration" defined under the code. As it now stands, the ordinance prohibits this.

The *World-Telegram* story stated that "the code permits the use in public buildings of seven refrigerants considered non-irritating and non-flammable. Six are manufactured exclusively, under patent ownership, by Kinetic Chemicals, Inc., du Pont—General Motors subsidiary. No provision is made in the code for use of any available substitute for the du Pont chemicals, such as methyl chloride, which many engineers regard as being as satisfactory as the refrigerants permitted."

'Monopoly' Charged on Sealed Units

The charge of "monopoly," which wasn't brought up in any of the discussions on refrigerants, was, however, hurled in connection with another provision of the code—article 1 (i), defining a sealed unit. The definition reads as follows: "Refrigerating system of sealed type: A refrigerating system which does not depend upon moving surfaces for the retention of refrigerant and which will not develop a refrigerant leak when subjected to a temperature of 700° F. for 30 minutes in an oven, when the system is fitted with a temporary device to relieve excess pressure over 300 lbs. per sq. in."

"I think General Electric is the only company that can qualify as a manufacturer of a sealed unit under this code," said Leo Kuhn, representing the Norge Corp. "The provision which specifies that the unit must not develop a leak when subjected to a 700° F. temperature creates a monopoly and does not promote safety."

Deputy Commissioner Giaccone asked how the provision created a monopoly, whether it was by certain patents, etc. Mr. Kuhn, after consultation with Ira Reindel, Norge engineer, stated that he wasn't prepared to answer the question at the time.

The commissioner then asked Mr. Kuhn to be prepared to answer the question at the next hearing.

Resume of Proceedings

No transcript of the proceedings is available at this time, but the following is a general resume of the more important part of the proceedings at the hearing, giving the substance of the questions raised, and suggestions made.

(The Deputy Commissioner's reading of the code and his calling for suggestions are omitted. It must be remembered that the code was not taken up in the order that it was written, due to the commissioner's effort to get an immediate reaction on the refrigerant provision.)

Mr. Reeves, representing the local section of the National Retail Dry Goods Association: Objected to not having been informed of the code being drafted and of the hearing.

The Commissioner: All interested parties will be given an opportunity to be heard at subsequent hearings before the Bureau of Combustibles and at the public hearing before the Board of Aldermen.

What Is 'Weakly Combustible?'

E. T. Williams, consulting refrigeration engineer: The term "weakly combustible" in Article 1 (n) nonflammable refrigerants is too indefinite.

W. W. Oser, Pure Carbonic Corp.: Carbon dioxide will not form a combustible mixture.

E. T. Williams: Question is not one of flammability, but what will be the products of decomposition when the refrigerant is in the presence of a flame.

A. H. Nuckolls, Underwriters' Laboratories: The term "weakly combustible" could be further defined along the lines of volume of refrigerant needed to propagate a flame, speed of the flame, etc.

E. T. Williams: The definition should take into consideration the range between high and low concentrations of the refrigerant. Ammonia is not flammable under the present definition.

C. K. Michaels, engineering inspector for the fire department, who drafted the code: We have had trouble with ammonia in fires in this city. The "splitting of hairs" on technical points is not pertinent to the code.

The Commissioner: The "splitting of hairs" sometimes means that something or somebody is "in" or "out" on a code of this type.

Dr. C. S. Cragoe, Senior Physicist, U. S. Bureau of Standards: The real question is:, will it propagate at ordinary combustion temperatures?

Definition of Air Conditioning

A representative of the New York Real Estate Board: The definition of "air conditioning" in the code should cover applications for processing work as well as those for human comfort.

E. T. Williams: The definition of the double indirect closed surface method of refrigeration is unnecessary. This method is not used as it is very expensive and inefficient.

J. H. Olsen, Carrier Engineering Corp.: The definition should be retained. Several installations of this type have been made and are working satisfactorily.

Charge Monopoly Is Given G-E

Mr. Lowell, Kelvinator Corp.: The definition of a sealed unit (Article 1 i) should be changed to conform with the changed provision on the melting point of solder (Sec. 224 a).

Mr. Kuhn, Norge division of Borg-Warner Corp.: General Electric is the only company that can qualify as a manufacturer of a sealed unit under this code. The provision which specifies that the unit must not develop a leak when subjected to a 700° F. temperature creates a monopoly and does not promote safety.

Mr. Vernon, Rex Cole, Inc., New York distributor for G-E: The provision respecting sealed units should be retained. Its inclusion in the previous code has proved itself as a safety measure.

The Commissioner: How does the provision as it now stands create a monopoly, by patents or by what means?

Mr. Kuhn: declared he was not ready to answer the question at this time.

The Commissioner: Asked that Mr. Kuhn be prepared to answer the question at the next hearing.

A representative of the Knickerbocker Ice Co.: The fact that there is a monopoly is generally known. Because of the definition under the old code, General Electric equipment only has been installed in public buildings.

The Commissioner: The Board does not want to be the agency for the creation of a monopoly, but we must have facts.

Mr. Michaels: There is no monopoly being created. General Electric and Electrolux both make hermetically sealed machines. The 700° F. provision should go to 1500° F., where it belongs.

Mr. Nelson, Airtemp, Inc.: Any company can make the same type of sealed unit that General Electric makes.

Question of Safety Devices

E. S. Lape, Curtis Refrigerating Machine Co.: Must safety devices for receivers be spring loaded so as to reseat?

Mr. Michaels: The provision respecting safety devices for receivers is such that 100 per cent relief is not intended. It provides that just the excess pressure shall be relieved.

Mr. Bryan, Frigidaire Corp.: Part of section 216 (b) which reads "containing 6 lbs. or less of refrigerant' should be deleted.

Section 216 (b) reads as follows: "A permit will not be required for a refrigerating system containing 6 lbs. or less of refrigerant, when located in the residence portion of a dwelling occupied by not more than two families, or in the residence portions of either a tenement house or a business building."

Mr. Kuhn: All the wording after the word "refrigerant" should be stricken out, and the following substituted: "when located in the residence portion of any building."

Fees for Installers

Mr. Hamilton, New York section of Refrigerating Machinery Association: In Section 216 (c) the fee for a licensed installer and servicer of refrigerating systems should be reduced from $100 to $10. The $100 fee would work a hardship on national manufacturers with branch sales offices, as the code as adopted by New York City will in all probability be copied by other major cities.

Mr. Kuhn: Section 216 (c) makes it necessary for the man who actually does the installation or service work to pass the examination and pay the fee. It doesn't allow a company to qualify a whole group of service men under one license.

Mr. Bryan: Section 216 (c) should stand as written.

Mr. Bump, American Institute of Meat Packers: Can engineers working for our members make installations in their plants?

Mr. Michaels: Yes, if he qualifies as a licensed installer.

The Director of Markets for the City of New York: There has been much laxity in these matters in the past. There should be an individual license for each man who is going to install or repair refrigerating equipment.

Installation of Small Units

Mr. Schwerin, General Electric air-conditioning distributor, New York City: Section 216 (c) should not be applied to the installation of small air-conditioning systems of the unit type for residence applications.

Mr. Bump: The provision in section 217 (a) that no refrigerating system containing more than 100 lbs. of refrigerant shall be operated in any building except under the personal supervision of either a duly licensed engineer or a person who has qualified, should be changed so as to read "1,000 lbs. of refrigerant." (It was then brought out by Mr. Bump and Llewellyn Williams, York Ice Machinery Corp., that the amount of refrigerant in a system was not always a good criterion of the size or rating of a system, as a comparatively small compressor sometimes pumps a lot of refrigerant to a system which has an extensive evaporator.)

Mr. Kuhn: Section 217 (d) which says that unit system refrigerators and unit system air conditioners shall be installed, serviced, and repaired only by a licensed installer should not be applied to residences.

Mr. Michaels: Someone should be responsible for even the installation of small units. There can be considerable danger in the *location* of a small refrigeration system, particularly in tenements or in the vicinity of public gathering places.

Mr. Schwerin: Would it be possible under section 217, which calls for a licensed operator and installer, to substitute a service contract with an independent service company qualified to do the work, instead of using the company's own employees?

Mr. E. T. Williams: Section 217 (d) should be amended to read that "a licensed installer should not be needed to install or move new, approved refrigerating systems of the unit type."

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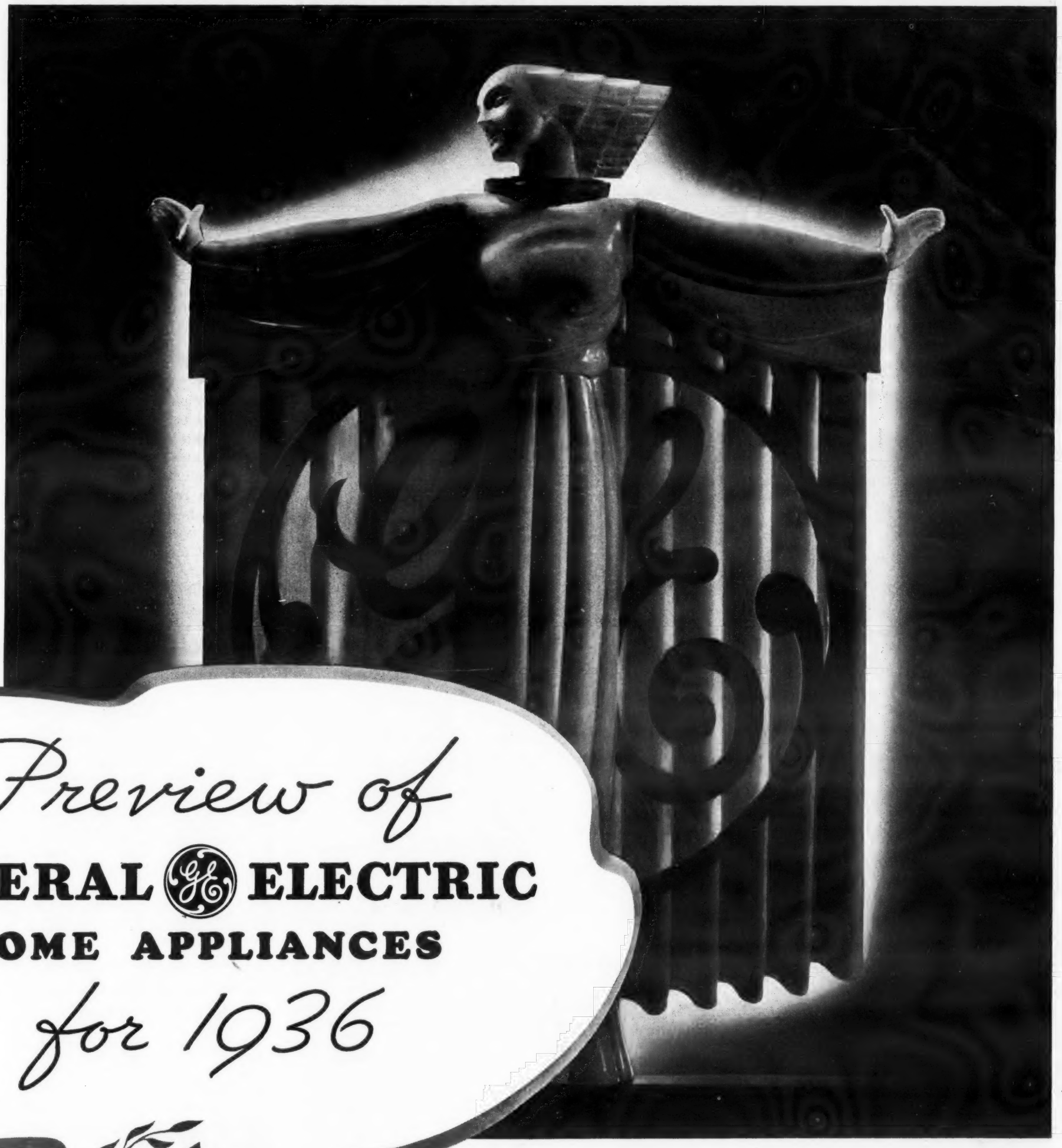
For an electric motor bearing to be really long-lived, the shaft which revolves in the bearing must be unusually smooth. In Delco motors, smoothness of the shaft is assured by burnishing in a special machine developed by Delco engineers. This operation insures long bearing life, permits the maintenance of close clearances and reduces friction loss to a minimum. This is only one of many special processes which help to make Delco motors the outstanding choice of household appliance manufacturers. Delco Products Corporation, Dayton, Ohio.

Made in Canada by the McKinnon Industries Ltd. St. Catharines, Ontario

DELCO MOTORS



Preview of

GENERAL ELECTRIC HOME APPLIANCES

for 1936

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★ *New* G-E Home Workshop

THERE'S big news in store for you at the General Electric Home Appliance *Preview* for 1936 to be held in your district. Don't miss it!

New models! New products! New merchandising plans! New profit opportunities!

Never before has the year ahead given such promise of volume and net profit for General Electric dealers. We predict 1936 will be the biggest year ever known for G-E Refrigerators and other G-E Home Appliances. At your *Preview* you will see the evidence upon which this prediction is based.

Communicate with the G-E Refrigerator Distributor in your territory for *Preview* dates and details. General Electric Company, Appliance and Merchandise Dept., Section DF121, Nela Park, Cleveland, Ohio.

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Simple and condensed instructions for the installation and servicing of all the fundamental types of household refrigeration systems, with special instructions for more than a dozen makes which are now in the "orphan" class.

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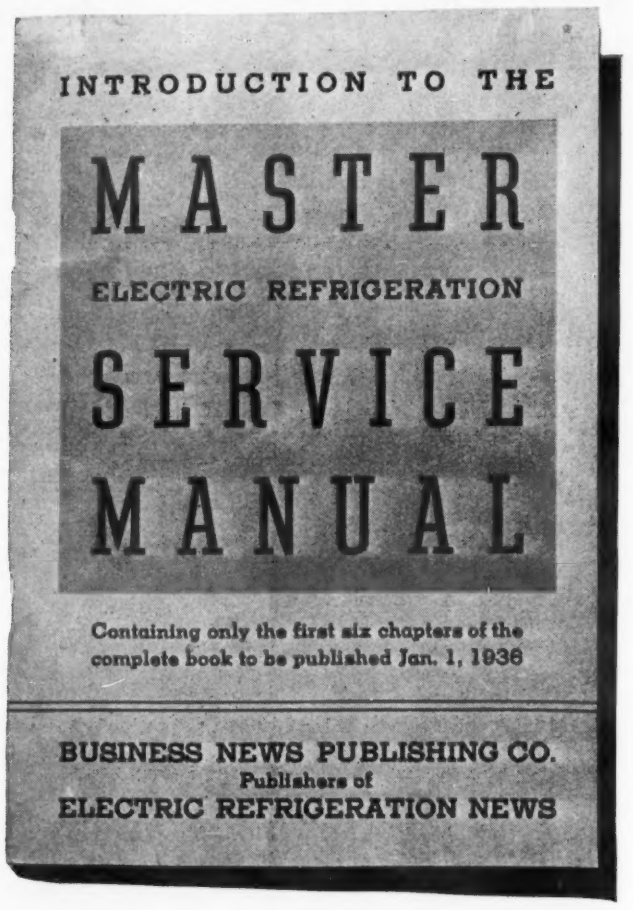
Place your order now for the Master Service Manual. You can begin with the introductory chapters immediately. The 112-page booklet shown here is given free-of-charge with every paid-in-advance order for the complete manual of over 400 pages to be issued in January, 1936. Price $3.00 per copy.



Get a copy from your jobber—

The refrigeration supply jobbers listed below are authorized agents for the Master Service Manual, and will deliver the introductory booklet containing the first six chapters when you place your order. These jobbers also have for sale at their retail counters the current issues of Electric Refrigeration News.

Aetna Supply Co.
407 E. 152nd St., New York, N. Y.

McIntire Connector Co.
253 Jefferson St., Newark, N. J.

Wm. M. Orr Co.
1230 Brighton Rd., Pittsburgh, Pa.

Henry V. Dick & Co.
514 Oates St., Charlotte, N. C.

United Refrigeration Supply Co.
941 Madison Ave., Memphis, Tenn.

Debes & Co.
1249 E. 105th St., Cleveland, Ohio.

J. M. Oberc, Inc.
1203 Stanley St., Detroit, Mich.

Young Supply Co.
1050 W. Baltimore, Detroit, Mich.

H. J. Schroeder Co.
1202 S. Calhoun St., Ft. Wayne, Ind.

Airo Supply Co.
410 N. Wells St., Chicago, Ill.

The Harry Alter Co.
5217 W. Madison St., Chicago, Ill.

The Harry Alter Co.
1728 S. Michigan Ave., Chicago, Ill.

The Harry Alter Co.
4611 North Western Ave., Chicago.

George Monjian Co.
360 East Grand Ave., Chicago, Ill.

Refrigeration Equipment & Supply Co.
5733 W. Chicago Ave., Chicago, Ill.

W-M Refrigeration Co.
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C. L. Percival Co.
11th & Cherry Sts., Des Moines, Iowa.

The Harry Alter Co.
2315 Washington Ave., St. Louis, Mo.

The Spangler Co., Inc.
3331 Market St., St. Louis, Mo.

Burstein-Applebee Co.
1012 McGee St., Kansas City, Mo.

D. C. Lingo Co.
306 M & M Bldg., Houston, Tex.

Refrigeration Service, Inc.
3109 Beverly Blvd.
Los Angeles, Calif.

California Refrigerator Co.
1077 Mission St.
San Francisco, Calif.

If your local refrigeration supply jobber is not listed above, send your order and remittance direct by mail to the publisher.

BUSINESS NEWS PUBLISHING CO.
5229 Cass Ave., Detroit, Mich.

Never Forget Prospect If You Want Business Claims Iowa Dealer

DES MOINES—"Never forget a prospect and don't let him forget you" seems to be the secret of success for C. E. McAfee, who operates the Central Electric Co. here.

"The reason we're selling electric refrigerators today," claims Mr. McAfee, "is because we found a way to keep in contact and serve our prospects during the time when they were unable to buy appliances from us."

"I believe the appliance repairing contacts offer the electrical dealer, whether located in a small town or in a city, a perpetual source of legitimate extra income and a means to make successful sales approaches."

Although located in the center of the business district here, Mr. McAfee derives a large proportion of his business from farmers and householders in surrounding small towns. Primarily a refrigerator salesman, Mr. McAfee is always willing to repair any electric appliance.

Kept Contacts in Depression

When the depression began, Mr. McAfee noticed that the farmers stopped dropping in for a talk with him when they were in the city on business, and so he looked for a way to keep in contact with them and remind them he was still selling electric refrigerators and other electric equipment.

"I went out to their farms and talked with them, and there I came across a market for maintenance which not only keeps my service shop busy, but enable me to keep the sales contact I was so anxious to hold. I found that even if they weren't ready to buy new refrigerators, they did occasionally need some repair work on old equipment.

"If a farmer's refrigerator broke down," Mr. McAfee explained, "I'd go out and look it over. If the job could be done on the spot, I'd take care of it then; if not, it was brought into town. We also do repair work on other electric appliances.

Selling Refrigerators Primary Job

"While we were more than willing to do these jobs, we never let our friends forget that primarily we were selling new electric refrigerators," he pointed out.

Maintenance and refrigerator sales have always been and probably always will be the most important factor in his business, declares Mr. McAfee, but he also believes that by doing odd jobs which are closely related to the functions of the shop he has found a way to get better acquainted with the trade.

In 1934, about 15 per cent of the Central Electric Co.'s income was derived from this special form of maintenance service, 50 per cent from the sales and repair of new electric refrigerators, and the remaining 35 per cent from the sale of batteries, electrical accessories and so on.

Personal Collection Visit Best

Mr. McAfee also believes in never forgetting the prospect when it comes to the credit question. "The dark days of the depression," he states, "taught me to be more careful about credit. If I sell a man something on 30 days' time, when that time has expired and he hasn't paid, I go and see him. I don't rely on letters or telephone calls, but find it best to make a personal visit.

"Experience has shown me that if I don't collect from him, I will not only lose my money but also a customer. I have also learned to pay more attention to credit investigation, and when I'm ready to talk business, I know just how my prospect pays his bills, what he is worth, where he works, and how long he has worked there.

"Careful extension of credit has meant that I have had only three or four refrigerator repossessions in the years I have been in business here."

Mr. McAfee employs one man all the time, and hires another in the rush periods. He does most of the sales work himself.

Electromaster Contest Winners Listed

DETROIT—Winners of the nation-wide "How I Made the Sale" contest recently conducted for retail salesmen of electric power companies by Electromaster, Inc., of this city have just been announced.

The five winners and prizes are as follows: Frank Smith, Gulf States Utilities Co., Lake Charles, La., first prize of $40; Granville Blair, Hartford Electric Light Co., Hartford, Conn., $20; G. J. Baumann, Union Gas & Electric Co., Cincinnati, Ohio, $10; C. H. Davies, Illinois Power & Light Corp., Bloomington, Ill., $5; and Jay L. Boyer, Dayton Power & Light Co., Dayton, Ohio, $5.

Electromaster plans to use some of the stories submitted in the contest in its retail sales manual on electric range selling. Every salesman who entered the contest will receive one of these manuals.

Sales Idea of the Week

By V. E. (Sam) Vining, Director of Department Store Sales, Westinghouse Electric & Mfg. Co.

Last week with my wife I drove through Union City, Ohio.

I was out of cigarettes and I pulled up at the curb in front of a corner Drug Store.

But—

I went *across the street* to a grocery and made my purchase.

Many years ago as a little tousel-headed country kid—all dressed up in my Sunday best, but, oh, so apparently from the farm—I walked into that Drug Store with 10 pennies in my hand and traded them for a "flip rubber" with which to make a "sling-shot."

That was my very first business transaction—and it turned out disastrously. When the deal was complete I bashfully waited to examine my new possession until I was out on the sidewalk. Then I found the rubber had a long jaggered hole right in the most vital spot.

Back into the store I went—with confidence. I came out again with tears in my eyes. I had been told very gruffly that those rubber strips were sold without guarantee.

I didn't know what the word "guarantee" meant—but I did know of the long weeks it took me to collect those pennies and of the hours I had spent picking just the right hickory fork from which to make my weapon.

I ran from that store crying—

"Cheat—Cheat."

That was forty years ago. But last week, even though my mind tells me my grievance is with a generation past and gone, there wasn't any power on earth that could have dragged my feet through the door-way of that store.

First G-E Kitchen in Milwaukee Completed

MILWAUKEE—First complete G-E all-electric kitchen in Milwaukee has been installed in the home of R. E. Moody, vice president and general manager of Wisconsin Gas and Electric Co. and Wisconsin Michigan Power Co.

The kitchen was sold and its installation supervised by E. C. Zabors, of the E. H. Schaefer Corp., General Electric distributor here.

The entire kitchen was rebuilt from floor to ceiling. Equipment consists of an Imperial range, a JSF dishwasher, a T-9 refrigerator, a G-E ventilating fan, G-E kitchen clock, and other kitchen appliances.

All-steel cabinets were furnished by the Elgin Stove & Oven Co. of Elgin, Ill.

The complete lay-out was designed by Victor Civken of General Electric Institute, Cleveland.

Emerson Electric Opens Branch in Detroit

DETROIT—Emerson Electric Mfg. Co., St. Louis, has opened a branch sales office in the Stormfeltz-Lovely Building, Woodward Ave. and Grand Blvd., here.

Electric Invisible Kitchen Opens New York Branch

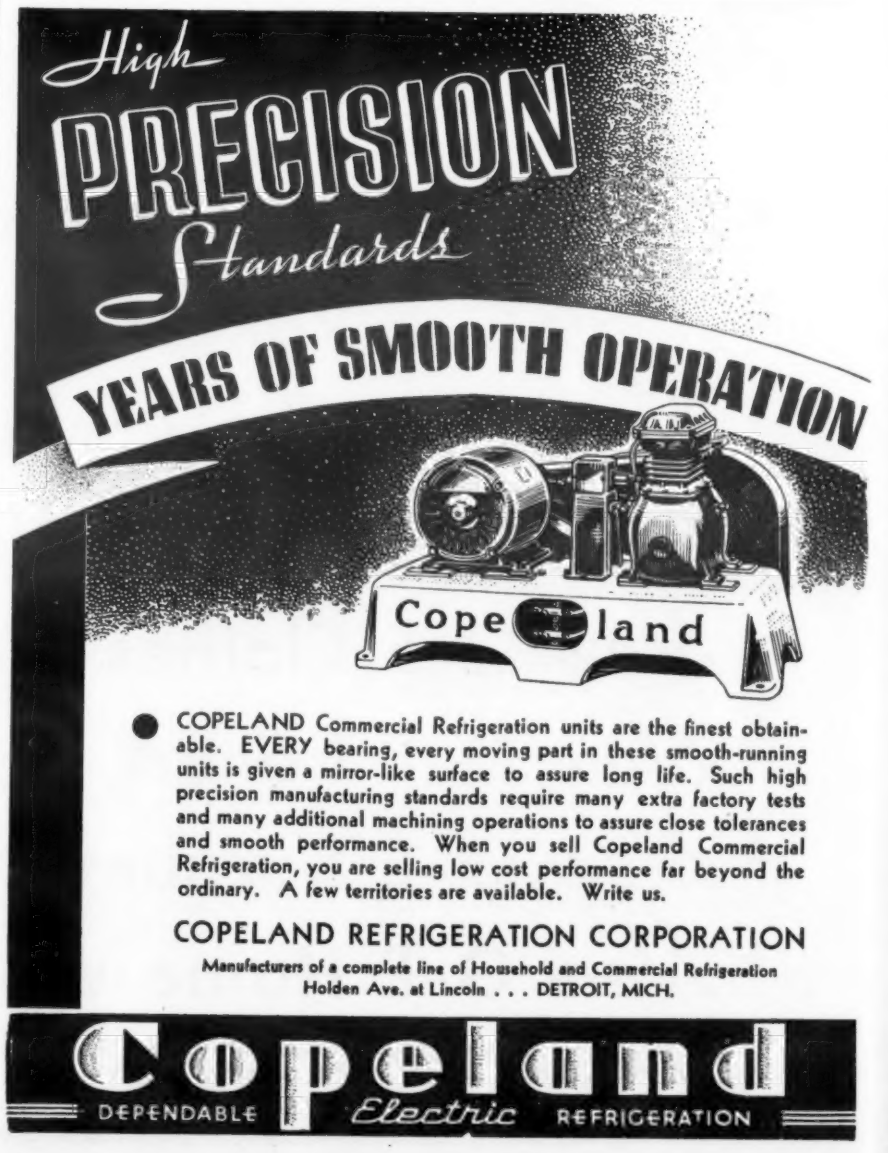
NEW YORK CITY—Electric Invisible Kitchen has opened a factory branch office at 12 East 41st St. here, under the trade name of Household Appliance Co., with Joseph Furlong as president, and Edward Goerk as vice president and sales manager.

The new branch is planning to open retail stores in Rockefeller Center, Brooklyn, and New Jersey after the first of the year. The organization covers New York, New Jersey, and Connecticut.

First public showing of the Invisible Kitchen complete line, including the new Invisible Kitchen and Service Pantry, was made at the National Hotel Exposition in Grand Central Palace here recently.

Small Will Direct Nema Development Dept.

NEW YORK CITY—O. C. Small of the National Electrical Manufacturers Association staff has been appointed director of the organization's business development department, replacing R. Bourke Corcoran, who formerly headed the department. Mr. Corcoran will be chairman of the staff of Nema's business development committee.



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Faster estimating means faster, easier selling. It means getting down to "brass tacks" on the first call, quickly finding out how interested the prospect is. *It means more prospects seen . . . more good prospects located . . . more business sold.*

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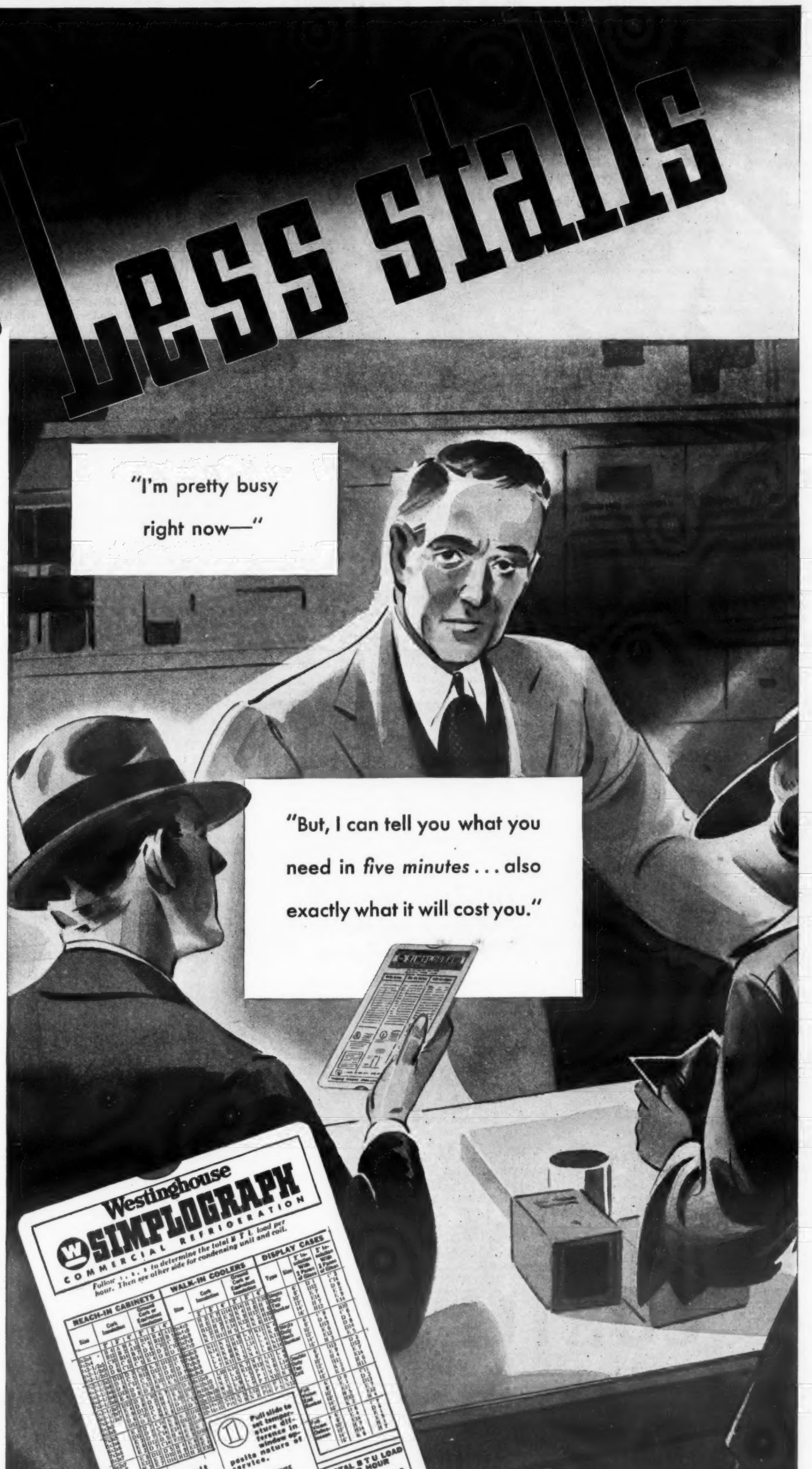
Distributorships available in a few major cities. Write for information.


"I'm pretty busy right now—"
"But, I can tell you what you need in *five minutes* . . . also exactly what it will cost you."
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FHA to Investigate Dealers Violating Housing Act Terms

(*Concluded from Page 1, Column 5*)

the efforts of dealers to obtain a profit over and above the list price of the unit he was selling.

In one type of illegal operation, known as the "cousin deal," the retailer would sell a refrigerator listing at $125 to a friend or relative for $175, later splitting the extra profit with the friend or relative, who let his payments lapse and allowed the refrigerator to be repossessed.

Another type of violation involved misrepresentation to the purchaser, the dealer or his salesman declaring that the installation was only on a 30-day trial basis—then getting the homeowner to sign the necessary papers which would allow the dealer to get his money from the insured institution.

A variation of this scheme is the "contest gag," in which the dealer asks to be given the privilege of installing the refrigerator on a trial basis "this week so I can have it count in the contest." He then gets the obliging prospect to "sign the necessary papers" which are in reality the credit report.

In other instances dealers are said to have so misrepresented the nature of the transaction that their customers thought they were getting an HOLC loan!

Other types of fraudulent practices uncovered include those in which electric refrigerators were sold to people without electric wiring in their homes; cases where people were inveigled into signing the receipts for the delivery of refrigerators when no delivery was made; and instances where people were persuaded to sign purchase agreements on the promise of premiums which exceeded the down payment in value—if a down payment was required.

The officials of the FHA here very frankly state their hopes that the industry will "police itself" to get rid of the abuses which have arisen under the act. Particularly are they glad to see local dealer associations in metropolitan areas taking action to prevent further occurrences of such abuses in their markets.

It was also pointed out that some of the insured loan institutions are "cracking down" on them by refusing to discount any more paper for dealers who have been a party to bad deals, unless the dealer takes the refrigerator back, returns the money, and pays a service charge.

The National Housing Act itself provides for penalties in case of violation. Section 512 (a) states:

"Whoever, for the purpose of influencing in any way the action of the Administration, makes any statement, knowing it to be false, or willfully overvalues any security, shall be punished by a fine of not more than $5,000, or by imprisonment for not more than two years, or both."

The majority of prosecutions, however, probably will be made on such general charges as impersonating a Federal officer, use of the mails to defraud, or conspiracy to defraud the United States, officials say.

Under the conspiracy charge, it is not necessary for any actual financial loss to be involved; it is only necessary to show that the conspiracy was for the purpose of interfering with the lawful operations of a Government agency.

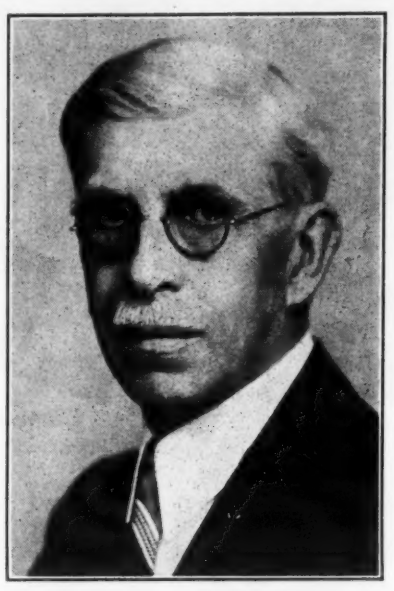
Whenever necessary, the investigations of alleged violations are conducted with the aid of the Department of Justice. Actual prosecutions are conducted with the active aid, and often under the actual direction of the District Attorney in the district where the alleged violation occurred, as these are Federal cases.

The FHA, of course, investigates every complaint reported officially and asks the aid of other government agencies when and if it is necessary.

With reference to the extension of the act next spring, the FHA personnel is apparently hoping for a movement somewhat paralleling the active boosting of some farmer groups and associations for retention of AAA.

For example, they're feeling rather elated about the fact that one trade publication in the plumbing field has a "write your congressman for the FHA" blank in every issue, and that individual manufacturers, trade associations, real estate boards, etc., are writing commendatory remarks about the act and recommending that it be continued.

A.S.R.E. President



L. S. MORSE
Executive engineer of York Ice Machinery Corp. was elected A.S.R.E. president last week.

EH&FA to Extend Plan As Soon as Utilities Sign Up as Agents

(*Concluded from Page 1, Column 3*)

appliances approved by the EH&FA which included refrigerators, ranges, water heaters, and pumps.

People who buy appliances under the plan must, of course, be customers of the utility so it can bill them.

Any utility in any community can sign up to operate with the plan, as long as it can meet the rate provision, Mr. Munger said.

General method of operation remains unchanged. Financing is still on a recourse-to-the-dealer basis.

With respect to the extension of rural lines by the Rural Electrification Administration, Mr. Munger said that such projects are not automatically eligible for the EH&FA plan, but that utilities sponsoring such projects must qualify and sign contracts. It is expected that a majority, or all of them, will do this.

Morse Elected New A.S.R.E. President

(*Concluded from Page 1, Column 3*)

Conditioning" was the general theme, with papers presented by Llewellyn Williams, engineer-in-chief, York Ice Machinery Corp.; F. H. Faust and F. D. Urban, General Electric Co.; and A. A. Berestneff, research engineer, Carrier Engineering Corp. Mr. Williams' paper is reported on page 12 of this issue, while Mr. Berestneff's appears on page 14.

Second session was devoted to "General Aspects of Air Conditioning," and was under the leadership of Dr. A. R. Stevenson of the General Electric Co.

Papers at this session were presented by Dr. W. J. McConnell, Industrial Health Section, Metropolitan Life Insurance Co.; Philip Drinker, Harvard School of Public Health; Dr. C. S. Cragoe, senior physicist, United States Bureau of Standards; and Harold R. Berlin (who presented a sound film on sound control), general sales manager, Transite Walls and Acoustical Department, Johns-Manville Sales Corp. These papers are reported in this issue as follows: Dr. McConnell—page 13; Mr. Drinker—page 13; Dr. Cragoe—page 13.

The fourth session was also devoted to air conditioning (subject: "Applications of Air Conditioning") although not a single paper was read.

E. W. Goodwin, senior mechanical engineer of the Procurement Division of the United States Treasury Department, gave a few oral pointers on doing contract business with the government, and outlined the mechanics of obtaining a contract with the Treasury Department.

"Don't try to take advantage of the government," he warned, "or you will be treated in kind. We are reasonable in the interpretation of contracts toward those who prove themselves to be reasonable with us."

Pamphlets containing the Proposed Standards for Rating and Testing Air-Conditioning Equipment, as printed in full in the Nov. 20 and 27 issues of ELECTRIC REFRIGERATION NEWS, were passed around the assemblage by Glenn Muffly, chairman of the joint committee of the A.S.R.E., N.E.M.A., R.M.A., and A.C.M.A. which has been preparing these standards over a long period of months.

Mr. Muffly asked for criticisms and objections, but received none.

Scheduled to deliver a paper on "Pipe Line Operations and Applications," Nels H. Rosberg, manager of production, California Consumers' Co., failed to appear. In his absence H. C. Guild of Vilter's New York agency talked briefly about Mr. Rosberg and the central system of piped refrigeration which he had designed and is operating out in Los Angeles.

Fred Ophuls then called the attention of the meeting to another central refrigeration service with a lengthy pipe line (bearing ammonia) which has been operating for more than three years in St. Louis.

C. S. Leopold, consulting engineer who designed the air-conditioning system which serves Gimbal's and Saks' big stores in New York City, concluded the session by personally showing the group the installation.

At the third session, chairmanned by Harry Williams of Frigidaire, these papers were presented: "Factors in Farm and Community Refrigeration," by W. R. Woodrich, R. B. Taylor, and Mack Tucker of the University of Tennessee (see report on page 16 of this issue). "SO_2 Film Heat Characteristics in a Vertical Evaporator Pipe," by Professors F. G. Hechler and F. C. Stewart, Pennsylvania State College (see report on page 6 of this issue).

Wednesday night the engineers heard student teams from Polytechnic Institute of Brooklyn and Stevens Institute debate the question: "Resolved, that engineering should be a closed profession." Thursday night the members and wives banqueted and danced on the Hotel Pennsylvania Roof.

Stewart & Hechler Give Data on Transfer Coefficients

NEW YORK CITY—Data on preliminary values for film heat transfer coefficients for a simple flooded evaporator were given by F. C. Stewart and F. G. Hechler of Pennsylvania State College last Thursday before the A.S.R.E. meeting here.

Among the general conclusions which Messrs. Stewart and Hechler drew from their studies were the following:

1. A minimum part of the evaporator area should be exposed to liquid and a maximum part of the area to boiling;

2. Increasing the mass-flow tends to decrease the average film heat-transfer coefficient;

3. Ebullators when used should extend for a considerable distance in the region in which boiling is expected to occur;

4. It is probable that if gas were introduced at the bottom of the evaporator it would serve as an effective ebullator.

5. To prevent the liquid returning to the bottom of the evaporator at too low a temperature below saturation the evaporator height should be held to reasonable limits.

Canadian Tariff Cut Effective Jan. 1

(*Concluded from Page 1, Column 2*)

Tariff Act of 1930, included "cooking stoves and ranges having as an essential feature an electrical heating element and parts thereof; any of the foregoing finished, or unfinished, wholly or in chief value of metal, and not specifically provided for." The old rate, 35%, has been reduced to 25%.

Canada's grant to us of the "most-favored-foreign-nation" rates means that the country has adopted, with respect to the United States, the non-discriminatory policy which the United States has long maintained toward all countries.

As a result, our export trade to Canada, with the exception that it is still somewhat affected by the system of British empire preference, should enjoy the advantage which naturally goes with our proximity to Canadian markets, and the similarity of the country's economic life in general to that of the United States.

Also, Canada has given assurance that it will change its system of valuing commodities for duties. In the past, the country has adopted a practice of applying arbitrary assessments exceeding the invoice value. Resultant charges were materially higher than normal duty rates.

As a result of the most-favored-nation status, American commercial travelers will be allowed the privilege of bringing in their samples under bond, instead of having to pay full duty, without refund.

Canada was our best customer in 1934, the electrical manufacturing industry alone exporting $8,583,000 worth of goods to that country.

Nema & Utilities to Cooperate in Kitchen Modernization Plan

(*Concluded from Page 1, Column 1*)

in approaching one of the markets from which practically all member companies will benefit in some measure.

Details of the activity will be under the supervision of an executive committee, on which utilities and manufacturers are equally represented.

George E. Whitwell, vice president, Philadelphia Electric Co., is chairman of the Bureau, and of the executive committee. R. E. Barnes, formerly assistant to the president, West Penn Power Co., will manage the Bureau. He will be located at E.E.I. headquarters here.

Vice chairman of the Bureau will also be a utility representative, and the treasurer of E.E.I. will serve the Bureau in that capacity also. O. C. Small, director of Nema's Business Development Department, will be secretary of the Bureau and the executive committee.

Members of the executive committee representing the utilities are: Mr. Whitwell; H. M. Sawyer, vice president, American Gas & Electric Co.; P. H. Powers, vice president, West Penn Power Co.; L. R. Parker, merchandise manager, Commonwealth & Southern Corp.; H. F. Smiddy, commercial manager, Electric Bond & Share Co.; G. J. Reichert, merchandise manager, Buffalo General Electric Co., and C. L. Harold, commercial manager, Brooklyn Edison Co.

The manufacturing representatives on the executive committee are: C. E. Swartzbaugh, president, Swartzbaugh Mfg. Co.; H. W. Burritt, vice president, Kelvinator Corp.; R. E. Imhoff, sales manager, merchandising division, Westinghouse Electric & Mfg. Co.; H. J. Mauger, assistant to president, Edison General Electric Appliance Co., Inc.; R. B. Marshall, president, Electromaster, Inc.; F. R. Pierce, manager, household division, Frigidaire Corp.; and P. B. Zimmerman, general manager, appliance sales division, General Electric Co.

C. E. Greenwood, commercial director of E.E.I. and Mr. Small are advisory members.

The country will be divided into zones, each presided over by a regional director, who will assume leadership in arranging for the organization of local bureaus, and coordinate their activities with the national office.

A plan book, with complete information on the organization and operation of local Kitchen Modernizing bureaus, is being prepared under the supervision of a joint manufacturers-utility committee.

Members of this committee are L. A. Clark, Frigidaire Corp.; W. A. Grove, Edison General Electric Appliance Co.; S. C. Mitchell, Kelvinator Corp.; S. D. Mahan, Westinghouse Electric & Mfg. Co.; H. P. Megargee, American Gas & Electric Co.; E. A. Holmberg, Brooklyn Edison Co.; and L. A. Fiorani, New England Power Co.

Tie-in with other national associations interested in promoting kitchen modernization is effected through inclusion in the Bureau of the following as members-at-large:

L. W. Davis, managing director, National Electrical Contractors Association; W. J. Donald, managing director of Nema; Donald E. Tolles, managing director, National Electrical Wholesalers Association; B. E. Weadock, executive vice president and general manager, Edison Electric Institute; R. R. Rau, managing director, National Retail Furniture Association; H. P. Sheets, managing director, National Retail Hardware Association; and Channing E. Switzer, managing director, National Retail Dry Goods Association.

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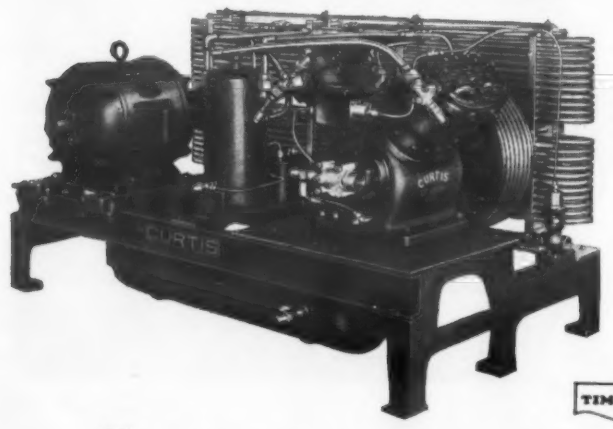

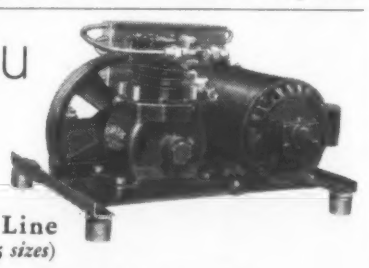

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- Timken Tapered Roller Bearings (*long life*)
- "V" Type Radial Design (*short sturdy crankshaft*)
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- Water Cooled Cylinders and Cylinder Head (*Highest efficiency*)

TIMKEN BEARING EQUIPPED

These features insure highest efficiency, low operating cost and long life.

There is a correct CURTIS Unit for every Commercial, Industrial or Air-Conditioning installation.

Sizes 1/6 H. P. to 15 Tons

CURTIS REFRIGERATING MACHINE CO.
Division of Curtis Manufacturing Company
1912 Kienlen Avenue, Saint Louis, U. S. A.

Artic
REG. U. S. PAT. OFF.
DU PONT METHYL CHLORIDE

Especially Made for Refrigeration

Now used by 35 manufacturers of domestic and commercial units in 44 out of the 80 types of machines in the country. Machine builders recognize that use of ARTIC in a well-designed and well-constructed machine gives a unit that users can rely on for dependable, automatic performance.

Strict production control and analytical tests on ARTIC before shipping assure you of receiving a product *always* low in moisture and acidity. Adequate stocks in selected distribution centers available at all times.

ENGINEERS, BUILDERS, SERVICE MEN: Send for FREE technical and other useful literature on ARTIC.

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COMMENT
By F. M. Cockrell

For some time I have been threatening to resume my column of "Comment," but the boys in the editorial department have not offered any encouragement.

Now that George Taubeneck will be leaving soon on his trip around-the-world it looks like a good opportunity to break into print again. At least, I won't have to argue the matter with George.

I may encounter difficulties, however, with Phil Redeker, managing editor. Apparently he is also anticipating George's departure and is becoming noticeably aggressive and opinionated about what should, and should not, be printed in the paper.

The three of us were in New York all last week on account of meetings of the American Society of Refrigerating Engineers and the Associated Business Papers, also the New York Code hearing, the Chemical Expositions, and other matters of interest.

Air conditioning was the leading subject on the program of the refrigerating engineers. It was discussed, or mentioned, by several speakers at the business paper meeting.

* * *

Low vs. High Prices

Samuel Dunn, editor of *Railway Age,* delivered a radio address on the economic situation in which he used air conditioning to show the manner in which new industries are developed to raise the standard of living and make more jobs.

Mr. Dunn is certain that prosperity cannot be achieved by *raising prices.*

Mass production by machinery, at constantly *decreased cost,* is the only way, he declares, that the standard of living may be raised through the widespread distribution of wealth in the form of salaries and wages.

The workman is benefited far more, he says, by *lower prices* on commodities than by *increased wages,* particularly, if increased wages also mean higher prices on goods.

* * *

Progress in Research

Other speakers on the A.B.P. program repeatedly hammered home the fundamentals of the economic system which has steadily developed this country throughout its entire business history.

It is evident that business paper editors have no hazy ideas about what makes the wheels go round.

Dr. H. C. Parmelee of *Chemical and Metallurgical Engineering* presented a very interesting and encouraging picture of the industrial *research* which has been in progress throughout the depression. The research laboratories all over the country have been working on innumerable new materials, new processes, new machines, and it is these new things which will provide the basis for *better goods at less cost.*

* * *

Papa, Mamma & Rosie

A. D. Whiteside, president of Dun & Bradstreet, the credit agency, told the editors that they need have no hesitancy in advising their trades and industry to *go ahead.* He based his viewpoint primarily on the improved financial condition of thousands of small businesses throughout the country.

This authority on who-pays-his-bills-and-who-don't reminded the audience that people *keep still about it* when they are beginning to make money *after a depression.*

The man who is accumulating some cash again has no desire to attract the attention of tax collectors, poor relations, and other hopefuls who knew him when.

Mr. Whiteside is credited with performing an outstanding service during the Blue Eagle Code epidemic. It was he who steadfastly resisted all efforts to write codes which would restrict the small business man by legalizing rules with which the small merchants could not possibly comply.

He dramatized the "Papa, Mamma, and Rosie" type of business—the family with a small shop or store.

* * *

Business Men of the Future

When the chairman of the meeting called on me to take part in the discussion, I told about the development of the *independent service man* in the refrigeration industry as an example of a new type of small business operator who will probably become a factor in the growth of the new air-conditioning industry.

As I see it, the new group of refrigeration supply jobbers and the independent service men have a real opportunity to become the suppliers of air conditioning to the *average* American home.

That job calls for a new type of contractor-salesman-mechanic and it offers a chance for the serious minded, well-trained, aggressive young service man to go into business for himself on a small scale and grow up with the industry.

Incidentally, we are planning to give to that type of young man, in the columns of the ELECTRIC REFRIGERATION NEWS, the kind of information he will need to take advantage of this new business opportunity.

Please note that I am not putting up any argument that the *average* service man of today is already equipped to be an air-conditioning dealer. Neither is the average householder ready to buy air conditioning, nor the average manufacturer ready to sell to that market.

Right now, the problem is to introduce air conditioning to the better grade of new homes. There is a lot of work to be done before the mass market will be ready to buy.

In the meantime, the young man who has had the nerve to set up his own shop and hang out a shingle, should be building up his list of satisfied customers who will have confidence in his *word* and his *workmanship* when they are ready to make another investment in health and comfort.

* * *

Hotel Problems

After the session, Ed Ahrens, publisher of *Hotel Management,* made some inquiries about sales activity in the commercial refrigeration field with the thought that it might have some bearing on a need for educational activity affecting the operation of hotel kitchens.

Later he introduced me to William Loud of the Nathan Straus Co., hotel supply jobbers, and C. Stanley Taylor who has been interested in cooperative campaigns in the building industries.

From these gentlemen, I learned that hotel managers have a deuce of a time maintaining personnel in their kitchens. The labor turnover averages about 40 per cent.

A hotel cook is considered a poor insurance risk because of the unhealthful conditions in most hotel kitchens. Heat, steam, and gas make his life almost unbearable.

Insulated electric ovens and other modern equipment available are the answer to the problem but it appears that there is no one making it his business to sell hotels on the ultimate economy and other outstanding advantages which justify the expense of discarding the old and installing the new appliances.

Public utilities have shown a disposition to cooperate in promoting the electric kitchen idea for hotels but a definite plan and program is needed to do the job on any sort of scale.

* * *

New Deal Autopsy

The real fun at the publishers' meeting came at the big banquet in the grand ballroom of the Waldorf-Astoria hotel which was attended by members of the association and their guests to the number of about 1,000.

S. Wells Utley, president of the Detroit Steel Castings Co. and past president of the Michigan Manufacturers' Association, dexterously cut open the New Deal and examined its internal workings.

He was followed by Colonel Frank Knox, publisher of the Chicago *Daily News,* who pulled the insides out of the carcass and scattered vital parts all over the place.

When the Honorable Henry F. Grady, head of the Trade Agreement Section of the U. S. Department of State, arose as the final speaker on the program, it looked like he was up against a mighty tough proposition.

He was undaunted by his task, however, and patiently began to assemble the fragments of the governmental body. Soon he had the audience laughing, and then cheering, his eloquent and good-natured rebuttal.

The Democrats might do well to appoint Mr. Grady as the official follow-upper of Republican speech makers during the coming campaign.

* * *

Picture the 1940 Model

Glenn Muffly, who figures that a patent a day will keep the wolf away, made the observation that the NEWS has never published any speculative pictures of *the refrigerator of the future.* "Automobile publications," he said, "are always printing pictures of the automobile of the future.

"What will the electric refrigerator of 1940 look like?" asked Mr. Muffly as a conversation starter as we stood on the sidelines watching the dance.

Taking his question in good faith, I told him what I thought it would look like but obviously Mr. Muffly was not impressed.

I judge that he has the answer himself but has no intention of divulging the information except to someone who is willing to pay for it.

Not to overlook a bet, however, Mr. Muffly is hereby invited to submit his idea of the refrigerator of the future for publication in ELECTRIC REFRIGERATION NEWS.

* * *

A Convention in Bed

At the A.S.R.E. meeting in the Pennsylvania hotel last week, I found that George Bright has discovered a way to save his feet at conventions.

According to his story, he was taken ill the night before the convention and *had* to go to bed. After that, so many people came to visit him that he decided to *stay* in bed.

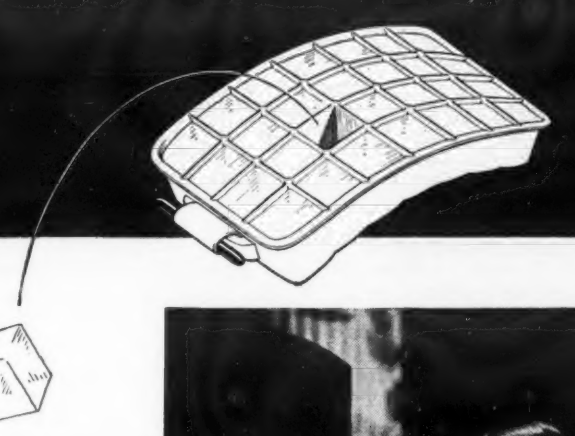
Another Good Trade Paper

Between courses of the A.B.P. dinner at the Waldorf-Astoria, Mr. Cockrell (right) exchanged remarks with A. J. Haire (left), president of the Haire Publishing Co., and Julian Elfenbien (center), editor of *House Furnishings Review.* George Taubeneck, who took the picture, modestly asserts that Mr. Elfenbien is one of the other really good trade paper editors in the country.

What Does a Space Buyer Laugh At?

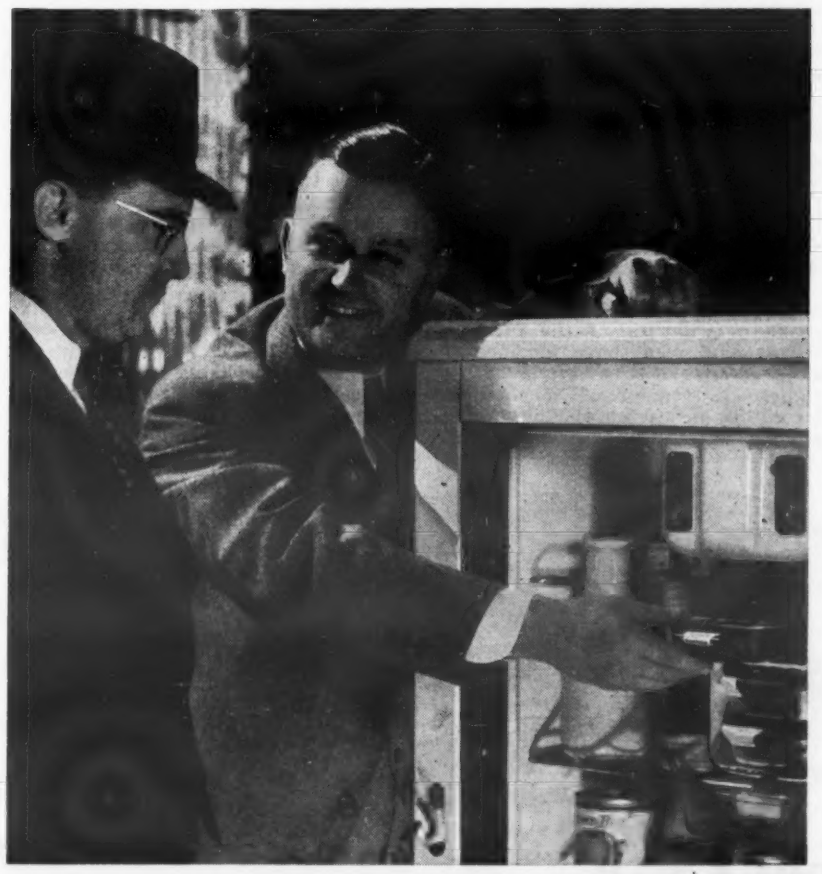
Since seeing this picture taken by George Taubeneck at the A.B.P. dinner, the publisher of the NEWS (left) has been trying to recall what story it was he told to J. J. Flanagan (right), research and media man of the Geyer, Cornell & Newell advertising agency. When a publisher can make an advertising space buyer laugh like that, either the story (or the publisher) must be funny.

A TRAY FULL OF TRICKS!



"COLD FACTS"
No. 13

It's a fact! Any model of the refrigerator you sell is easier to sell if it has Flexible Rubber Trays or Grids. INSIST that all models come factory-equipped. Write to your manufacturer or direct to us. The Inland Manufacturing Co., Dayton, Ohio.



Customer: "That's what I want—Flexible Rubber Trays!"

Salesman: "Mister—this refrigerator has everything you want!"

No Refrigerator is Truly Modern Unless it Has
Flexible Rubber Trays or Grids
—and the Public Now Knows it!

STATISTICS

Government Survey Shows Relationship of Refrigeration Ownership & Income For Salt Lake City, Utah

SALT LAKE CITY—Evidence of the close relationship between income and ownership of an electric refrigerator, as well as an insight into the potential market for the product, is contained in the fifth of a series of Department of Commerce surveys, covering consumer use of goods and services in the Salt Lake City territory.

Besides refrigerators, home ownership, heating, cooking, and lighting facilities, bathing facilities, and automobile ownership are also covered in the study, which was made under the direction of Ada Lillian Bush, chief of the consumer market section of the department's marketing research and service division.

City's Population 34,410 Families

According to 1930 census figures, Salt Lake City has a population of 24,410 families, of which 33,933 are white, and 477 of other racial groups. In this study 6,528 families, or 19 per cent of the total population, were interviewed. This number, though small, is considered typical of the city's population as a whole, and as such is sufficient to give an indication of income and purchasing relationships among all classes.

Not quite 1 per cent of the families studied reported incomes of $7,000 or more, up to $15,000, and 3.6 per cent asserted they were without income of any sort during 1933, the year covered by the survey.

Almost 49 per cent of the Salt Lake City families had incomes of less than $1,000 for the year, while 33.9 per cent reported incomes ranging between $1,000 and $2,000. Incomes of $2,000 or more were reported by the remaining families, 17.3 per cent.

Retail Sales for 1933

Total retail sales in the city, during 1933, were $42,109,000, and wholesale sales were $60,629,000, as reported in the census of American business, taken at this same time.

Mechanical refrigerators, the survey reveals, are used by about three-fourths of those families in Salt Lake City that have incomes of $3,000 or more per year, and by 26.5 per cent of all families in the city.

Tenants and families who occupy their own homes show only a slight fractional difference in the percentage of those who make use of this equipment, owner-occupants owning 26.7 per cent, and tenants 26.4 per cent of the total number of refrigerators in use.

17% in Homes Under $1,000 Income

Less than 17 per cent of the total number of refrigerators used in the city are in the homes of families that have incomes below $1,000 a year. More than two-fifths of the families with this equipment have incomes of $2,000 or more.

Highest proportion of mechanical refrigerators in use in the city is in the homes of the income group reporting $7,000 or more annually. Almost 85 per cent of the families in this group have this convenience.

Laurels for the greatest number of refrigerators in use, however, go not to this group, but to the one reporting yearly incomes between $2,000 and $3,000.

Almost 60 per cent of the homes in this income class are refrigerator-equipped, and 21.4 per cent of all refrigerators used in the city are in this group.

A study of the individual income classes, as regards their use of mechanical refrigerators, reveals saturation percentages ranging from 5.4 per cent, for the $1 to $500 class, to 84.4 per cent for the $7,000 and over income group.

Saturation by Income Groups

Individually the figures run:

$7,000, and over class: 84.4 per cent, or 38 families with mechanical refrigeration out of 45 reporting; $5,000 to $7,000: 79.3 per cent, or 46 families out of 58 reporting; $3,000 to $5,000: 75 per cent, or 246 families out of 328; $2,000 to $3,000: 59.8 per cent, or 415 families out of 694; $1,500 to $2,000: 40.5 per cent, or 367 families out of 907; $1,000 to $1,500: 25.8 per cent, or 337 families out of 1,305; $500 to $1,000: 11.8 per cent, 178 families out of 1,503; $1 to $500: 5.4 per cent, or 79 families out of 1,451; "no income" class: 11 per cent, or 26 families out of 237.

99.5% of Homes Wired

An approximation of the number of refrigerators in use in the city can be gained by taking 26.5 per cent, the average saturation in all income classes, of the total number of families in the city.

Market for electric refrigeration in the city is wide, 99.5 per cent of all families being users of electricity for lighting purposes. Since only about one-fourth of all families have refrigerators, however, it is evident that availability of electricity is not the chief consideration in buying.

Income differences are a major consideration.

From the dealer's viewpoint, the 84.4 per cent of refrigerator owners in the $7,000 and above income class is overshadowed in importance by the $2,000 to $3,000 class, in which the greatest number of refrigerators is concentrated.

$1,000 to $3,000 Class Own 64.5%

Families with incomes between $1,000 and $3,000 comprise 64.5 per cent of all reported users of mechanical refrigerators in the city. Even the lowest income class, $1 to $500, has a larger share of Salt Lake City's total number of homes equipped with mechanical refrigeration than the highest income class. The figures are 4.6 per cent as compared with 2.2 per cent.

This demonstrated ability of a substantial portion of the families in each income group to buy mechanical refrigerators suggests that there is an undeveloped potential market in each group. No income class fails to have some members equipped with mechanical refrigerators. The fact that 15.6 per cent of even the highest income class has no mechanical refrigerators suggests itself as a wide-open sales opportunity for the aggressive dealer and distributor.

22.1% Cook with Electricity

The fact, as stated above, 99.5 per cent of Salt Lake City families use electricity for lighting leaves little need for further comment. Most of the .5 per cent that do not use electricity are below $500 in annual income.

Above $1,500 income, all families in the city use electricity for lighting.

Slightly more than one-fifth (22.1 per cent) of all families in the city cook with electricity; about 33 per cent use gas. The other 45 per cent use other fuels, principally coal.

As compared with gas, electricity is used by a larger percentage of all families with annual income above $2,000, 51.6 per cent of these families using electricity, and 38.5 per cent gas.

About one-fourth of the families who occupy their own homes cook with electricity, while not quite 16 per cent of the tenant families in the city use electricity for this purpose.

Three-Fifths Own Autos

Automobiles are owned by about three-fifths of all families in Salt Lake City. Less than 3 per cent of these families have more than one car. In other words, there are distributed among the same people slightly more than two and one-fourth times as many automobiles as mechanically-operated refrigerators.

There appears to be some relationship between status of tenancy and automobile ownership, since about 48 per cent of the tenant families are without a car, as compared with 33 per cent of the home owners.

Since more than one-third of even the lowest income class have automobiles of some kind, and no group fails to show a fairly high percentage of car owners, the influence of income on car ownership does not stand out from the study of any one group. The relation, however, can be clearly seen in the steady increases in the ratio of cars to families as the income of the group increases.

Most cars are in the $1,000 to $1,500 income class; most one-car families are in the group with incomes between $2,000 and $3,000.

Potential Market

Indication of the potential market for electric refrigerators, ranges, and other home appliances may be gained from a study of the following table, which lists comparative figures for the various income groups, as relates to ownership of electric refrigerators, one automobile, and the use of electricity for lighting:

Income	Percentage of Ownership: Refrigerator	Automobile	Electricity
No income ...	11.0	35.4	97.5
$1 to 500	5.4	38.8	98.7
$500 to $1,000.	11.8	48.9	99.7
$1,000 to $1,500	25.8	63.6	99.8
$1,500 to $2,000	40.5	73.4	100.0
$2,000 to $3,000	59.8	75.9	100.0
$3,000 to $5,000	75.0	73.8	100.0
$5,000 to $7,000	79.3	67.2	100.0
$7,000 and over	84.4	71.1	100.0
All classes ...	**26.5**	**57.0**	**99.5**

51,588 Household Refrigerators Sold in October 1935, by 14 Manufacturers

The following 14 member companies of the Refrigeration Division of the National Electrical Manufacturers Association (Nema) reported household refrigerator sales for October, 1935: Apex Electrical Mfg. Co., Crosley Radio Corp., Frigidaire Corp., General Electric Co., Gibson Electric Refrigerator Corp., Kelvinator Corp., Leonard Refrigerator Co., Norge Corp., Servel, Inc. (export only), Stewart-Warner Corp., Sunbeam Electric Mfg. Co., Uniflow Mfg. Co., Universal Cooler Corp., and Westinghouse Electric & Mfg. Co. Member companies not reporting included: Jomoco, Inc., Merchant & Evans Co., and Sparks-Withington Co.

The sales of the reporting companies do, however, include units manufactured for the following concerns: Major Appliance Corp., Montgomery Ward & Co., Potter Refrigerator Corp., Sears, Roebuck & Co., and Truscon Steel Co.

	SALES FOR OCTOBER, 1935					
	Domestic		Canadian		Other Foreign	
Lacquer (Exterior) Cabinets Complete	**Quantity**	**Value**	**Quantity**	**Value**	**Quantity**	**Value**
1. Chest	298	$ 14,487	2*	$ 98*	1,496	$ 77,012
2. Less than 3 cu. ft.	62	3,632	.....	.....	16	835
3. 3 to 3.99 cu. ft.	1,668	95,173	27	1,531	2,086	118,916
4. 4 to 4.99 cu. ft.	6,633	429,802	201	14,131	3,458	227,094
5. 5 to 5.99 cu. ft.	6,055	476,044	51	3,767	1,382	108,096
6. 6 to 6.99 cu. ft.	4,477	408,831	53	4,899	708	65,187
7. 7 to 7.99 cu. ft.	3,514	372,792	74	8,290	292	30,191
8. 8 to 9.99 cu. ft.	837	95,109	6	660	65	7,490
9. 10 to 12.99 cu. ft.	57	11,076	.....	.....	1	208
10. 13 cu. ft. and up	7	1,677	.....	.....	.....	.....
11. Total Lacquer	**23,608**	**1,908,623**	**410**	**33,180**	**9,504**	**635,029**
Porcelain (Exterior) Cabinets Complete						
12. Up to 4.99 cu. ft.	198	15,303	26	2,443	90	7,051
13. 5 to 5.99 cu. ft.	1,719	152,935	0	4	195	17,284
14. 6 to 6.99 cu. ft.	1,166	120,562	.....	.....	167	16,776
15. 7 to 7.99 cu. ft.	1,889	228,358	1	117	184	22,771
16. 8 to 9.99 cu. ft.	1,027	146,543	7	774	93	14,116
17. 10 to 12.99 cu. ft.	296	53,573	2	398	56	10,923
18. 13 cu. ft. and up	156	39,050	1	212	29	7,504
19. Total Porcelain	**6,451**	**756,324**	**37**	**3,948**	**814**	**96,425**
20. Total Lines 11 and 19	**30,059**	**2,664,947**	**447**	**37,128**	**10,318**	**731,454**
21. Separate Systems ¼ Hp. or Less	9,380	373,339	.....	.....	1,003	54,421
22. Separate Household Evaporators	298	5,168	59	939	24	472
23. Total Lines 20, 21, 22	**39,737**	.....	**506**	.....	**11,345**	.....
24. Condensing Units ¼ Hp. or Less	268	16,669	6	362	488	25,141
25. Cabinets—No Systems	213	10,010	.....	.....	344	6,389
26. Total Household	.....	**$3,070,133**	.....	**$38,429**	.....	**$817,877**

*Indicated in report as to be subtracted from totals.

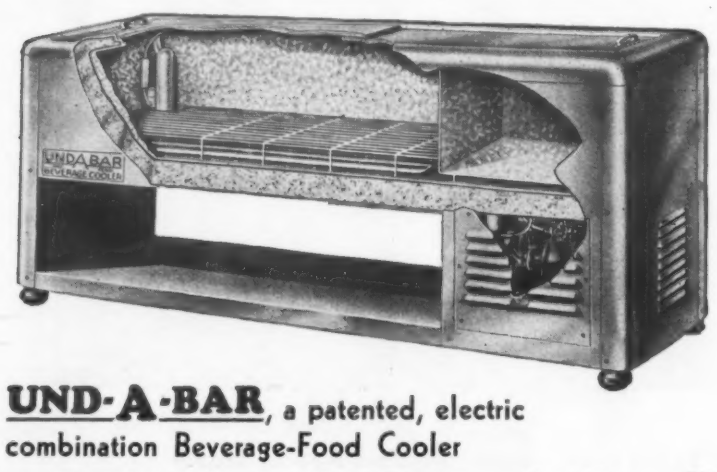
19 Companies Sell 6,350 Commercial Systems during October, 1935

Commercial sales for October, 1935, were reported to the National Electrical Manufacturers Association (Nema) by 19 companies, some of which are not members of the association. These reports cover the sale of units less than 1 hp. in size. Companies reporting are: Baker Ice Machine Co., Brunner Mfg. Co., Carbondale Machine Corp., Carrier Engineering Corp., Crosley Radio Corp., Frigidaire Corp., General Electric Co., Gibson Electric Refrigerator Corp., Kelvinator Corp., Leonard Refrigerator Co., Merchant & Evans Co., Norge Corp., Phoenix Ice Machine Co., Reliance Refrigerating Machine Co., Servel, Inc., Uniflow Mfg. Co., Universal Cooler Corp., Westinghouse Electric & Mfg. Co., and York Ice Machinery Corp.

	SALES FOR OCTOBER, 1935					
	Domestic		Canadian		Other Foreign	
COMMERCIAL	**Quantity**	**Value**	**Quantity**	**Value**	**Quantity**	**Value**
1. Water Coolers Complete	565	$ 58,299	3	$ 305	122	$ 13,427
2. Water Coolers Remote	55	3,287	2	96	1	113
3. Ice Cream Cabinets Complete	101	10,963	.....	.....	18	2,767
4. Ice Cream Cabinets Remote	110	14,379	1	98	8	1,237
5. Beverage Coolers Comp.	437	34,763	2	152	25	1,913
6. Beverage Coolers Remote.	114	9,093	.....	.....	51	3,012
Condensing Units						
7. Less than ⅛ Hp.	597	30,178	6	399	1,229	70,795
8. ⅛ to ½ Hp. Inc.	1,573	138,309	20	2,058	1,059	93,233
9. Above ½ and Less Than 1 Hp.	480	60,714	10	1,333	103	13,432
10. Total Lines 7, 8, and 9	**2,650**	.....	**36**	.....	**2,391**	.....
11. Total Lines 1, 3, 5, 10	**3,753**	.....	**41**	.....	**2,556**	.....
12. Evaporators	3,329	85,601	82	2,851	840	25,829
13. Miscellaneous Cases and Cabinets	24	5,050	7	1,571	4	919
14. Total Commercial	.....	**$450,636**	.....	**$8,863**	.....	**$226,677**

New York & California Lead in State Sales For October, 1935

States and Territories	Quantity of Household Low Sides
Alabama	319
Arizona	95
Arkansas	3
California	4,968
Colorado	211
Connecticut	334
Delaware	87
District of Columbia	635
Florida	2,800
Georgia	411
Idaho	59
Illinois	2,667
Indiana	662
Iowa	297
Kansas	171
Kentucky	280
Louisiana	453
Maine	82
Maryland	409
Massachusetts	1,677
Michigan	1,512
Minnesota	311
Mississippi	126
Missouri	503
Montana	57
Nebraska	161
Nevada	40
New Hampshire	69
New Jersey	1,645
New Mexico	44
New York	7,326
North Carolina	390
North Dakota	32
Ohio	2,395
Oklahoma	159
Oregon	221
Pennsylvania	4,234
Rhode Island	112
South Carolina	221
South Dakota	77
Tennessee	364
Texas	1,553
Utah	36
Vermont	42
Virginia	423
Washington	413
West Virginia	179
Wisconsin	442
Wyoming	30
Total United States	**39,737**
Canada	506
Other Foreign (Including U. S. Possessions)	11,345
Total for World	**51,588**



UND-A-BAR, a patented, electric combination Beverage-Food Cooler

The UNDaBAR is selling fast and making big money for dealers because it is something bar operators have been wanting badly. It boosts sales at the bar by its efficient cooling, at the same time cutting down expenses. UNDaBAR can be purchased on easy monthly payments (F.H.A.) smaller than former ice bills. Money that used to go for ice is now an investment in a profitable fixture.

200 bottles or 500 cans, in addition to food (in the "dry-cold" compartment) can be kept in the UNDaBAR, always at exactly the correct temperature (33-38°) because of the dependable, automatic Refrigerating Unit and Coil. No more worry about daily icing and repacking—no more "frozen" hands. Bottles stay neatly arranged.

Dealers are enthusiastic. Every dispensing outlet is a prospect, and liberal discounts assure big dealer profits. Desirable exclusive territories are available for substantial dealers who act quickly.

UND-A-BAR is a MONEY-MAKER for users and DEALERS

- Fits under the Bar
- No Ice
- Sliding Roller-bearing Top
- No lids to lift
- Movable Partitions
- Automatic Temperature Control
- Low Operating Cost
- No Spoilage
- Less Work
- Easy Monthly Purchase Plan

Get the details about this real *profit opportunity* by mailing in this coupon *NOW!*

Manufactured by
UND-A-BAR Division, General Import Company
218 N. 4th St. St. Louis, Mo.

UND-A-BAR, Division, General Import Co.
218 North Fourth Street
St. Louis, Missouri

GENTLEMEN: Please send full information on the new UNDaBAR and the money-making opportunity offered to dealers.
I understand, of course, that this inquiry places me under absolutely no obligation.

Name .....
Address .....
City ..... State .....

AIR CONDITIONING

Air Conditioning Boosts Summer Business Of Harrisburg Drug Store 25%

HARRISBURG, Pa.—The comforts of air conditioning brought an increase of 25 per cent in total summer business for Caplan's drug store here, relates Phillip H. Caplan, proprietor, and the store's luncheon business was boosted a full third on summer days when Harrisburgers sought relief from the noonday heat.

Located right "on the square" in Pennsylvania's capital city, Caplan's handles a full line of drugs, cosmetics, jewelry, leather goods, tobaccos, and candies, and in addition operates a high class luncheonette. The building is on a southwest corner so that the sun beats down on store windows both morning and afternoon.

When Proprietor Caplan first considered air conditioning last spring, he was hesitant on two counts.

First, he had heard that air conditioning meant keeping all doors and windows closed tight, and he didn't want to close his front door, because years of merchandising experience had taught him that his open front door was a direct invitation to passersby to step in for small items.

Second, he didn't like the idea of having sheet metal ducts installed among his attractive store furnishings.

Both of these problems were solved to his complete satisfaction.

York Ice Machinery Corp. engineers devised an air-distribution system which would allow Mr. Caplan to leave the front door open all summer without disturbing the distribution of air, or imposing a severe load on the cooling system, and it was largely because of their guarantee of satisfaction with the arrangement that he gave York the order.

As for the ducts, he has been pleased with the way all ductwork blends in with other fixtures in the store, and in fact, he now claims that their outspoken evidence of the air-conditioning system is an asset because they serve to emphasize to his customers that he has had air conditioning installed for their comfort.

Some of the obvious benefits of air conditioning cited by Mr. Caplan are a marked appreciation of it among his customers, better dispositions of his 40-odd employees, and consequently more courteous service by them, and better condition of candies, resulting in increased candy sales.

One of the most important results of the installation is its advertising value—both by word-of-mouth and as a subject for newspaper advertising and window signs. The store also distributes match-books mentioning the air conditioning.

Mechanical equipment for the air conditioning is all installed n the basement. This includes a 10-hp. York Freon condensing unit, and a York horizontal air conditioner from which the air is distributed by ducts to the sales spaces above. Operating cost (power and water) ran about $150 for the summer.

The installation was sold by R. H. McWilliams of the Philadelphia branch of the York Ice Machinery Corp.

Large Air-Conditioning System Will Be Installed in Kansas City Auditorium

KANSAS CITY, Mo.—Equipment for what is thought to be the largest single refrigerating system ever assembled for air-conditioning purposes in the middle west, is going into the new municipal auditorium here.

Contract for designing and furnishing this equipment was awarded to York Ice Machinery Corp. by United States Engineering Corp.

Funds for the erection of this mammoth building at a total cost of $5,000,000, were provided in part by the Public Works Administration, and the remainder by public subscription, when citizens of Kansas City voted a bond issue, three years ago, for the purpose of carrying out an elaborate building and public improvement program for their city.

The air-conditioning plant consists essentially of four separate York Freon water-cooling systems, which are identical in design.

Major elements of each system consist of one 4-cylinder 15x13½-in. York Freon compressor, connected directly to a 400-hp. synchronous motor; Freon shell and tube condenser; Freon shell and tube water-cooling unit, with auxiliary and miscellaneous equipment, and pipe mains.

Each of the four systems is designed to cool water at the rate of 750 g.p.m. from a temperature of 48° F. to 40° F. or a total of 3,000 gallons of water per minute. This water, at 40° F., is circulated by centrifugal pumps to six large air washer units, located at various points throughout the building.

A system of ducts for the supply and return of air, and the introduction of fresh air, is installed in connection with these air washers. The combined air-handling capacity of these washers and fans circulates approximately 625,000 c.f.m.

These air washers are also equipped with heating coils, and the entire system, including ducts, washers, and fans, is designed not only to cool and dehumidify the air in summer, but to heat and humidify the air in winter.

As the building is of the most modern windowless design, this is an important feature, as the system is designed for complete year-'round air conditioning and ventilating service, in a degree that shall be adequate to supply at all times and under all conditions the normal functions of fresh air and ventilation ordinarily obtained from the windows.

Automatic by-pass control regulates the functioning of all washers. Each of the four systems will develop a refrigerating capacity of 254 tons, providing a total refrigerating capacity of 1,016 tons.

24 Westinghouse Conditioners Used in Cooling Sacramento Department Store

SACRAMENTO, Calif.—"Now Hale's makes its own weather."

This headline, topping an illustration of Hale's department store, with a huge thermometer jutting from the roof, announced in a full page newspaper advertisement the installation of a complete air-conditioning system in this department store.

Fifteen ES-60 air conditioners and nine ES-62 units comprise the equipment, which was installed by Edward B. Ward & Co., Westinghouse dealer in this city.

The ES-60 units are supported from the ceiling, and magnetic liquid line valves connect to a thermostat to control the refrigerant flow to banks of three units, which supply automatic temperature control.

In the cooling pond on the roof, condensing water is recirculated and cooled by evaporative cooling, by forcing it through Binks spray heads. There are 750 g.p.m. of water circulated through the condensers and through the spray heads for cooling.

Air is completely conditioned every 15 minutes, which represents the circulation of 5,000,000 cu. ft. of air per hour. Cooling effect is equivalent to the melting of approximately 160 tons of ice in warm weather.

Ornamental enclosures of modernistic design are arranged to conceal the unit and the piping.

Keeping Pace

OUR engineering staff is continually alert to improve the line of ACE HARD RUBBER DOORS, RAILS, JAMBS and other parts for Display Refrigeration Equipment. Manufacturers look to us for standard products and dependable service. They get it.

A complete catalogue will be mailed to manufacturer who wishes to consider Ace products and Ace service.

AMERICAN HARD RUBBER CO.
11 MERCER STREET, NEW YORK, N.Y.
Akron, O. • 111 W. Washington St., Chicago

Raleigh Firm to Handle Lipman Equipment

RALEIGH, N. C.—Montfort Plumbing & Heating Co. has been appointed distributor of Lipman commercial refrigeration and air-conditioning equipment for this territory.

December 11, 1935.

Mr. Manufacturer:

Business is better. Depression complaints are out of date. But competition is not out of date—as you probably know very well.

The push upward toward 1940 will make (and break) many companies. The ones who best KNOW THEIR BUSINESS will forge ahead. And to know your business you must know the industry. You must follow its developments, its innovations, its people, its news—as closely as possible.

BUT NOT *JUST* YOU. Every man in your organization with a responsible position—in engineering, production, and sales—must also be alert to what's going on throughout the industry.

So we are offering a suggestion which we firmly believe can build a better organization for you. Begin 1936 with a GROUP SUBSCRIPTION to the News. It will keep your organization currently informed on refrigeration and air-conditioning developments in every branch of the industry and all parts of the world.

You know the VALUE OF INFORMATION. Consider the group rates given below. We believe you will want to have the order form mailed today. It's worth your time to see that it is done.

Very truly yours,

ELECTRIC REFRIGERATION NEWS

ELECTRIC REFRIGERATION NEWS offers these special rates for paid-in-advance group subscriptions. Please note that charge orders are billed at the single-subscription rate, regardless of number.

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100 or more, each	$1.50

Date.....

Business News Publishing Co.
5229 Cass Avenue
Detroit, Mich.

Please enter our group order for ..... copies of Electric Refrigeration News each week for one year, at $..... each (see rate opposite). Address individual copies to each of the names on the attached list.

Our remittance for $..... is enclosed.

Company .....

Ordered by .....

Street .....

City ..... State .....

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VOL. 16, NO. 15, SERIAL NO. 351, DEC. 11, 1935

The Next Big Cooperative Push

NEWS of prime importance to everyone engaged in the selling of electrical appliances to American households is to be found on page 1 of this issue, where it is reported that the National Electrical Manufacturers Association and the Edison Electric Institute have joined hands to form the National Kitchen Modernizing Bureau. In the articles of organization, the founders of this Bureau state that its purpose is "to promote the sales of electric refrigerators, ranges, water heaters, and other kitchen appliances."

On the face of it this may sound like "just another scheme." But when one examines the list of men responsible for the movement, and those who have contracted to direct it, this National Kitchen Modernizing Bureau begins to assume its true proportions. From the electric refrigeration industry, for instance, the following leaders are contributing their active services to the executive committee: Henry W. Burritt, vice president in charge of sales, Kelvinator Corp.; Frank R. Pierce, sales manager, Frigidaire Corp.; P. B. Zimmerman, general manager, appliance sales division, General Electric Co.; and Roger E. Imhoff, sales manager, merchandising division, Westinghouse Electric & Mfg. Co. Serving on the committee which will prepare and publish a plan for the organization of local bureaus are S. D. Mahan, Westinghouse merchandise advertising manager; L. A. Clark, Frigidaire advertising manager; and S. C. Mitchell, Kelvinator advertising manager.

Experienced Executives in Charge

Moreover, these men know exactly what they are doing and going to do, for they have been through the mill before on similar cooperative promotional set-ups. The National Kitchen Modernizing Bureau is following closely the pattern, plan, and methods utilized by the Electric Refrigeration Bureau of the National Electric Light Association a few years ago; and many of the men who will guide the efforts of this new Bureau had executive experience in the previous one. P. B. Zimmerman, especially, has been promoting cooperative campaigns of this nature, and along almost exactly the same organizational lines, for a number of years—dating back to his days with the National Lamp Works, when he developed the outlines of this utility-manufacturer-dealer cooperative idea for the promotion of mazda lamps.

In profile, this highly effective plan of promoting the sale of an electrical appliance—in this case, several related electrical appliances—consists of banding utilities, manufacturers, and dealers together in a common, mutually profitable cause. Utilities profit by the addition of extra current load on their lines; manufacturers and dealers profit by increased appliance sales. The manufacturers contribute to a common fund for cooperative national advertising. Utilities and dealers tie up in local advertising campaigns. The utilities also offer showroom space for cooperative exhibits, sponsor special "weeks," stage contests for both consumers and salesmen, put on public demonstrations (such as "cooking schools") and, in some instances, enter actively into the merchandising phase themselves. Supported by funds from both manufacturers and utilities, a national headquarters staff organizes and coordinates the activities of local bureaus, prepares instructions for local campaigns and stunts, provides literature, issues bulletins and statistics on the progress of the drive, and generally keeps one or more field men on the road constantly, delivering inspirational speeches and consulting with local bureaus and committees.

This plan has been followed with signal success in "putting across" a number of electrical appliances. But never before has it been used to promote a *group* of appliances. The idea of selling electric appliances for the kitchen as a group, an idea which General Electric has been pushing recently in its own organization, was suggested by ELECTRIC REFRIGERATION NEWS more than four years ago (back in the days when electric refrigeration dealers were *exclusive,* and sold nothing but refrigerators). In an editorial titled, "Food Equipment Retailing," which appeared in the July 1, 1931, issue, the NEWS stated:

Proposed by the News in 1931

"Perhaps electric refrigeration dealers may become 'food equipment merchandisers,' and make a specialty of helping the housewife put better meals on the table with less effort and at smaller cost.

"Furniture stores have found that sometimes it pays to hold special sales of single high quality pieces, such as chairs, lamps, or tables, at no-profit prices. Snatching at a bargain, a family will proudly acquire a handsome new chair. Once the chair is ensconced in the living room, however, the remainder of the furniture begins to look shabby by comparison. In due time a whole new outfit of equal quality is purchased to make the rest of the room, or even the entire home, meet the standard set by the new chair.

"The appearance of a good-looking and efficient new electric refrigerator in a kitchen may have the same effect. The fuss and bother of an old coal stove may prompt the lady of the house to seek a new electric range which is as trouble-and-worry-free as her electric refrigerator. She may decide to look into the merits of electric dishwashers and water heaters. And should a salesman bring around one of the new food mixers and preparers, he may find her in a receptive mood.

"Such appliances offer electric refrigeration sales organizations an opportunity to take other kitchen appliances to their present owners and prospects. Few sales organizations will have such a valid claim to the giving of genuine service to the public as will the merchandisers of equipment for the handling of food."

Auspicious Year for Campaign

The coming year seems an especially auspicious one for this campaign. Administration measures designed to speed home modernization and new home construction will give added impetus to the movement. Business is getting better. Money is flowing more freely through the channels of trade. Local appliance sales organizations are thoroughly experienced and fully trained to do a real job.

These factors, combined with the experience of the men selected to direct the movement, augur exceedingly well for its genuine success. Every dealer will do well to get on the bandwagon early, so as to get his share of the profits which will undoubtedly accrue from fruition of the program.

LETTERS

Kanaka? Okeydoke

Theo. H. Davies & Co., Ltd.
Honolulu, Hawaii

Editor:

This letter re your proposed World Tour goes forward via the first air mail from Hawaii to the continental United States.

We take this opportunity to extend to you a most cordial invitation to make your headquarters with us during your visit in Hawaii. Rest assured that we shall do everything possible to convert you into a true "kanaka" ere you leave these shores.

The writer wishes to also extend to you at this time the Season's Greetings, with Best Wishes for a Gladsome Yuletide.

Aloha,
J. W. RUBENSON.

List of Jobbers

Westinghouse Electric & Mfg. Co.
653 Page Blvd., Springfield, Mass.

Editor:

We are interested in obtaining a list of jobbers of refrigeration and air-conditioning supplies throughout the country to pass on to our own air-conditioning distributors who often require assistance in locating suitable suppliers. We have your 1935 REFRIGERATION AND AIR CONDITIONING DIRECTORY but do not find jobbers of refrigeration supplies listed therein. Will you please furnish us with any information you may have along the lines indicated. HOWARD A. BLAIR,
Air Conditioning Service Engr.

Answer: See list of refrigeration supply jobbers listed as authorized agents for the MASTER SERVICE MANUAL on page 4 of this issue. This list with additional names will be republished in an early issue.

Replacement Parts

Republic Electric Co.
Davenport, Iowa

Editor:

In your refrigeration and air conditioning directory of 1935 we do not find a list where we can buy replacement parts for Frigidaire and Kelvinator units. If you have such a list of these manufacturers we would appreciate same or if you would advise them to get in touch with us, as we are looking for a connection where we can buy this equipment so that we can sell to dealer and service trade.

We are now jobbers for the Kerotest fittings, the United Wire & Supply Co. tubing, G. S. Robins Co. chemical refrigeration gas, American Injector Co., and many others. We are in a position to do quite a line of merchandising providing the prices are right.

E. L. BENGSTON,
Asst. Sales Manager.

Answer: Manufacturers of replacement parts are now being invited to advertise their products in the new MASTER SERVICE MANUAL which will be completed about Jan. 1. Also we understand that Frigidaire has recently adopted a somewhat more liberal policy in the matter of supplying parts to concerns outside its own organization.

Wants Catalogs

Watson Way
Bellefontaine, Ohio

Publisher:

As an independent service man of five years experience I would like to be placed on the mailing service you are forming. I am a subscriber to your paper. CHARLES W. COOK.

Answer: We will gladly add your name to the list for the catalog mailing service now being established by Business News Pub. Co. Other independent service men are invited to register for these mailings at no cost. There will be a nominal charge to the manufacturers for addressing and mailing catalogs and trade literature.

Master Service Manual

2108 Avenue M
Brooklyn, N. Y.

Editor:

I hear that your MASTER REFRIGERATION SERVICE MANUAL is to be published Jan. 1, 1936. Will you kindly answer some questions about it? Will it be *complete?* Will it be indexed? Will it have articles on Frigidaire, Hotpoint, and Universal Cooler in it?

GEORGE F. STONE.

Answer: The MASTER SERVICE MANUAL will contain simple and condensed instructions on all the fundamental types of household refrigeration systems. It is designed to assist the service man in distinguishing characteristic differences between these broad types and classifications of equipment and in determining the proper procedure for the replacement and adjustment of those parts which are subject to wear or which may cause inefficient operation if defective or improperly adjusted.

Experienced service men who have read those parts of the MASTER SERVICE MANUAL already published in the NEWS declare that it is the clearest presentation of the subject that they have ever encountered.

The author, Mr. K. M. Newcum, has had long and successful experience in servicing all makes of refrigerators and in teaching classes of refrigeration students in trade schools and shops. In brief, we are fully convinced that Mr. Newcum "knows his stuff" and that the MANUAL will measure up to the expectations of service men who have long been wanting just such a book.

Gee-Ruzalum!

Anti-Defamation League
of B'nai B'rith
130 N. Wells St. Chicago

Editor:

Our attention has been called to an item which appeared in your valuable publication of Oct. 23, 1935. On page 8 in the third column as part of the article by Mr. R. J. Thompson, we find this expression:

"Such simple change-overs will literally become 'Goldberg' machines, of which the manufacturer or the converter can never be proud," etc.

We are, of course, mindful of the fact that you have merely printed the article as submitted to you. We are equally mindful of the fact that there was perhaps in this careless expression no desire to offend any people. I know that there are amongst the many readers of your publication many Jewish people with substantial interests in the industry to which you cater.

It should be obvious, however, that there is a very definite imputation to the term "Goldberg" machines, particularly when the name Goldberg is quoted. Since to my knowledge, at least, there is no electric refrigerator nationally known by the trade name of "Goldberg" we must look for the reason for its creation. First of all, the name Goldberg very definitely implies a Jewish connotation, and it is used in this connection to express cheapness and unsatisfactory character. Therefore, the intent is clear and while perhaps unwitting, is none the less a slur against Jewish business men.

We admit that there are unscrupulous Jewish dealers. Are there not likewise unscrupulous dealers from all other groups? If other groups have exemplary business men, are there not many outstanding Jewish firms thoroughly esteemed for their ethical approaches to everything commercial? This being so, is it not both unwise and unfair to gratuitously offend a large group of people? Particularly, is it not unwise in times of great stress such as those through which we are now passing?

Our organization is concerned solely with the creation of good will between groups in America. We believe that incidents such as the one herein referred to are not conducive to such good will, but are in fact, ultimately destructive of it. May we not hear from you in connection with this matter, and urge that in future the effort be made to assure that articles such as this may not appear in a publication as reputable as your own.

RICHARD E. GUTSTADT,
Director.

Answer: We are amazed that an organization which is apparently so sensitive to the reputation of Jews does not know what a "Goldberg" is.

Cartoonist "Rube" Goldberg, authentic genius of the comic, and a credit to his race, has achieved such international fame for his series of cartoons depicting "nutty" inventions and highly complicated machines for doing simple operations, that "Goldberg" has become a commonly accepted generic term to designate any machine or device designed according to poor—or "nutty"—engineering principles.

Hence, the use of the term "Goldberg" in this instance was not a slur upon the Jewish race, but instead was a bit of flattery of one of its most prominent members.

If Mr. Gutstadt's organization, which seems to be in the business of hunting for trouble, has to search so hard as this to find defamation of the Hebrews, we should say that the race seems to be in little danger of suffering from unmerited indignities in the public prints.

Opening for Apprentices?

2512 Ohio St.
Michigan City, Ind.

Editor:

1. Can you tell me of any large company in the refrigeration or air-conditioning field that is willing to take on refrigeration technicians as apprentices in order to train capable men?

2. Has the refrigeration manual been published as yet? If so, what is its price? EARL KILLINGBECK.

Answer: (1) Does any manufacturer have an apprenticeship proposition? (2) The MASTER SERVICE MANUAL will be off the press in January.

"I have been in the refrigeration game for the past eight years and have found your publication of great value."—Harry P. Dilkes, The Carbondale Machine Co., 5938 Chew St., Philadelphia, Pa.

ENGINEERING

Williams Explains Factors to Be Considered in Building Freon Compressors

NEW YORK CITY—Research and experiment conducted at the plant of York Ice Machinery Corp. demonstrated that compressors designed for ammonia should not be used with Freon, and that there are very definite design considerations to be taken into account when a Freon compressor is being built, declared Llewellyn Williams, engineer in chief, York Ice Machinery Corp., at the opening technical session of the A.S.R.E. meeting here last week.

Mr. Williams spoke on "Data from Experiment and Research Preceding the Construction of Large Freon Compressors." Among the most important points brought out in the discussion following his address was that the valve area of a Freon unit as compared with that of an ammonia compressor should be about 5 to 1, with pipe areas roughly 2 to 1.

Three years ago, Mr. Williams explained, York decided to develop a line of large size Freon compressors to be used chiefly for air-conditioning applications.

Complete Line of Ammonia Units

At the beginning of its interest in large Freon compressors, York had in production a complete line of highly developed ammonia compressors, suitable for all the purposes of refrigeration.

It was desired to use these machines with the fewest possible changes. It was up to the engineering department to know definitely just how a compressor which had been originally developed for ammonia would perform with Freon. Having obtained this information, the changes shown by the test results to be necessary to the development of a Freon machine could be made, Mr. Williams said.

In the meantime, a thorough theoretical study of Freon refrigeration and compression was being made to permit an intelligent attack of the problem and to save experimental expense and time.

Thermodynamic Properties

"A comparison of some of the thermodynamic properties of Freon and ammonia, covering a fairly large temperature range," said Mr. Williams, "shows at a glance, several points of interest to the designer of ammonia compressors who is preparing to design a Freon machine, such as:

"1. Over the same temperature range the magnitude of the saturation pressure range is much less for Freon than it is for ammonia.

"2. The weight rate of gas per ton of refrigeration to be handled is much greater for Freon than for ammonia.

"3. The specific volume of the saturated Freon gas is far less than that of ammonia; in other words, Freon gas is very dense or heavy as compared to ammonia."

Differential Pressures

For the air-conditioning rating temperatures of 35° F. and 110° F., the pressure range for Freon is from 47.28 lb./in.^{2} absolute to 150.7 lb./in.^{2} absolute, a differential pressure of 103.4 lb./in.^{2} as compared to a differential pressure of 180.7 lb./in.^{2} for ammonia. Hence, for the same bearing size and loading, Mr. Williams pointed out, Freon cylinders can be made approximately 35 per cent greater in diameter than ammonia cylinders. Where for manufacturing reasons, the same stroke and crankcase is kept, this will be a substantial gain to the designer.

Items 2 and 3, above, indicate that the tests of an ammonia compressor pumping Freon will probably show that the suction and discharge valves are entirely unsuitable for Freon, even though the cylinder volume is increased to take care of the increased volume of gas per ton of refrigeration.

Compressor Size or Speed

Calculations on the ideal refrigeration cycle for Freon and ammonia show that the refrigeration per pound of Freon is about 10 per cent of that possible from ammonia, and that 9.23 times as many pounds per minute of Freon are required to do one ton as compared to ammonia. However, the low specific volumes of Freon afford some compensation, as it is necessary to pump only 80 per cent more volume per ton. This materially affects compressor size or speed, Mr. Williams noted.

The theoretical work required for compression shows that the adiabatic horsepower per ton is about 9 per cent less for Freon than for ammonia, being 0.905 and 0.992 for Freon and ammonia, respectively.

"A word of warning must be sounded to the engineer who is apt to draw final conclusions without verifying his calculated results in a well equipped test plant," said Mr. Williams.

"The actual test results were somewhat contradictory; that is, with the best intentions on our part, ammonia requires almost exactly 9 per cent less power than Freon does per unit of work. However, we are still carrying on our experimental work, and there is every reason to believe that we will eventually bring our two lines of machines into their theoretical position regarding power required per ton."

Use of Ammonia Machine

First test made was with a standard ammonia compressor, Mr. Williams said. The machine selected for the test with ammonia and Freon was a 9 in. bore x 9 in. stroke two-cylinder, vertical single-acting, enclosed type compressor of standard construction.

The system was piped up and charged with ammonia, and the machine was run for some time to make sure that it was in good mechanical condition. The valves had been tested statically with oil and were believed to be tight.

Ammonia was removed from the system, the oil changed and the system charged with Freon.

Compression Ratio

Test results enumerated by Mr. Williams showed that the compression ratio was 2.86 as compared to 5.71 during the ammonia run, effect of the suction and discharge valves and ports was restricted, that a standard ammonia compressor, using Freon gas, operating at its rated speed, uses 37.2 per cent of its indicated power to induce and discharge gas from the cylinder, and that there was excessive leakage past the valves during the compression stroke.

It is apparent from the results of these two comparative tests, declared Mr. Williams, that a good ammonia compressor cannot be expected to pump Freon economically at the standard speed of the ammonia compressor. Further, he said, the valves were noisy during this test, a condition which is not permissible in air-conditioning work.

Modifications of Compressor

The compressor was then modified as follows: the free gas passage area through the suction and discharge valves was increased 150 per cent and 100 per cent, respectively; the cushioning effect on the valves was decreased; the suction port area was considerably increased; and the shape of the cylinder discharge head and volume were changed to give a much increased gas space above the valves and to provide for the pressure surge set up by the action of the discharge valves.

The machine was again put into operation, and after equilibrium was reached, indicator cards were taken at two different speeds.

Results of these runs show, Mr. Williams believes, a real step in the development of a Freon compressor. The valves at the higher speed were too noisy, but the wasted power was much reduced and the volumetric efficiency acceptable, being 88.2 per cent, which shows good valve action. Valve and discharge head changes indicated that there was less leakage.

Conclusions Drawn from Test

Conclusions drawn by Mr. Williams from these first tests on the compression of Freon gas are:

1. Ample gas passages must be provided in the cylinder walls and valve openings, and all passages must be "streamlined," since all restrictions cause high energy losses and a consequent penalty of increased horsepower.

2. A combination of quiet and tight valves is a difficult problem.

3. Judging from the polytropic exponent of compression, the valves that are tight for ammonia are not tight during the pumping of Freon.

4. Increasing the operating speed of a Freon compressor greatly magnifies these difficulties.

5. Water jackets are not required for ordinary ratios of compression.

From the information obtained by the modifications to the standard 9 in. x 9 in. compressor in regard to port areas and valves, it was decided to build an experimental Freon compressor, said Mr. Williams.

The crankcase and stroke of the 9 in. x 9 in. machine were retained, but an 11 in. cylinder was built and assembled. This change increased the volume per stroke approximately 50 per cent, with but a small increase in cost as only the cylinders, pistons and valves are new. The housing, shaft, connecting rods, bearings, and all other parts are the same as the standard 9 in. x 9 in. machine.

Initially, the suction valves, which were of the multiple poppet type, were given 80 per cent greater opening and the discharge valves 100 per cent greater opening than would ordinarily be used for this type of valve.

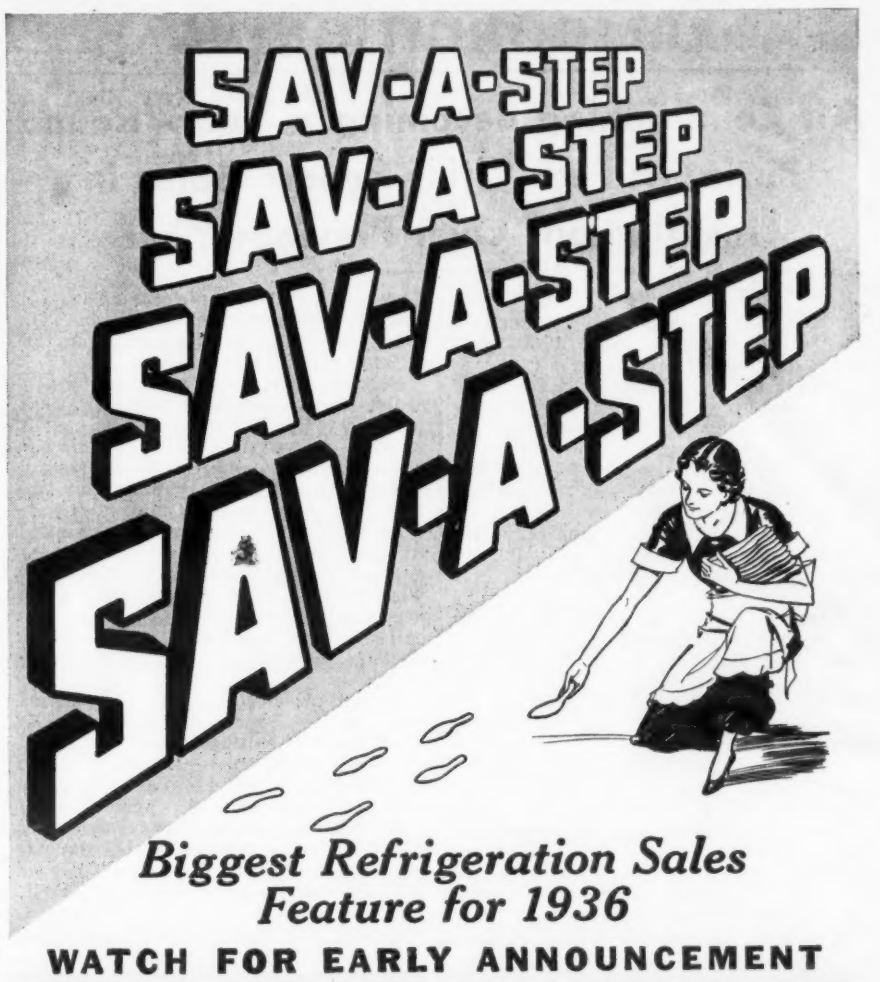
Test on Modified Machine

Design of the cylinder head shape and safety head holding down devices were completely changed so as to give an ample discharge space. The suction ports in the cylinder walls were made unusually large.

Following the completion of the machine, Mr. Williams related, a number of runs were made. At 225 r.p.m. the valves operated very quietly, but at the higher speed of 298 r.p.m., they were too noisy for air conditioning and indicated that additional work was necessary to reduce the valve noise and still maintain a valve with an optimum efficiency.

However, from a standpoint of gas volume induced and discharged as compared to the earlier tests on the 9 in. x 9 in., the results are remarkably good and justify the changes in design, Mr. Williams said.

In making changes to obtain optimum valve conditions, suction valve lifts were increased and balanced off seats and suction port area increased.



Biggest Refrigeration Sales Feature for 1936

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MODERN DISPLAY FIXTURES are served

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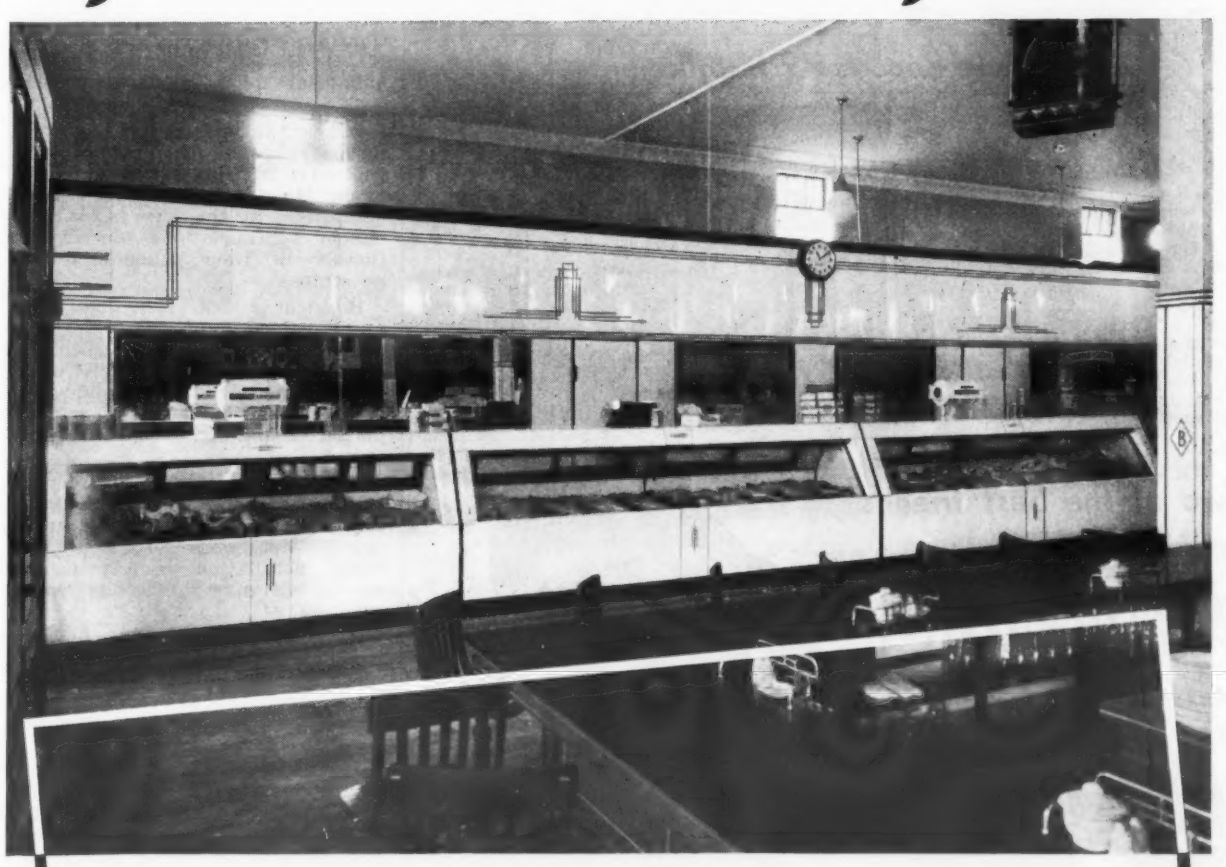

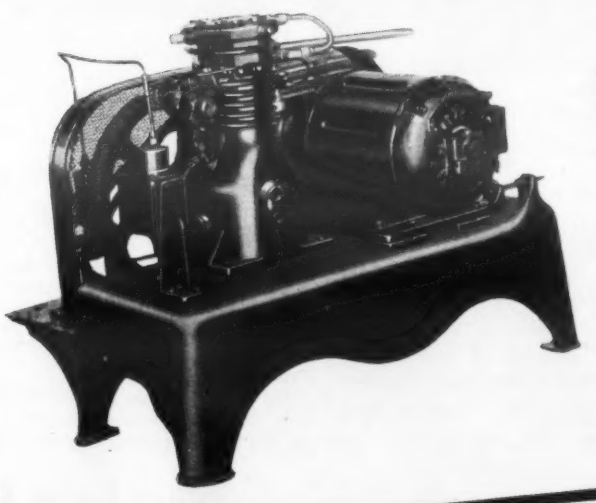

Universal Cooler Condensing Units are used by the manufacturers of the better grade of store fixtures because they are efficient, reliable and economical. They are available in all sizes from 1/4 to 15 h.p.

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AIR CONDITIONING

Air Conditioning Becoming a Year-'Round Business; Four Cities Report Gains in Installations Over Previous Year

(Concluded from Page 1, Column 2)

stores, clothing stores, and undertaking establishments, pointed to for years as good prospects for air conditioning, this year came into actuality as customers, with the result that 1935 installations in these markets doubled the total for all preceding years.

Hospital installations, and doctors' and dentists' offices, also showed a marked improvement over previous years. Many hospitals await only improved financial conditions before installing conditioning equipment, Mr. Porter believes.

A rather surprising record is shown by the old established markets, restaurant and theater. New restaurant installations for the first nine months of the year show an increase of 50 per cent; theaters a gain of 31 per cent.

Few large installations were made during the period, only two being above 100 hp. size. One of these was a department store, and the other an office building, both being rated at approximately 250 tons of refrigerating capacity. Several theaters were in the 100-ton classification, and two five-and-10 cent stores and an office building in the 80-ton group.

Total volume of sales was considerably under predictions, due, in Mr. Porter's opinion, to an unusually cold spring, since hot weather did not set in until July.

Residences Lead in Philadelphia

Installations in Philadelphia for the period totaled 108, compared with 309 in all previous years. In number, residential jobs took the lead, totaling 24 against 37 in all years prior to 1935. Retail stores were next in line, with 20 applications totaling 694.3 hp., and restaurants next, with 15 installations for a total of 432.3 hp.

Most notable applications, however, were in the commercial field. Four unclassified installations were made here, for a total horsepower of 1,768.5.

Theater installations totaled 10, for 419 hp. Five candy plants were outfitted with conditioning equipment, for a total of 175 hp.

Sales in the city were materially aided by promotional material sent out by Philadelphia Electric Co. among potential customers in the city's industrial plants, stores, restaurants, miscellaneous commercial applications, and better type residences.

Promotional literature was mailed in geographic groups, at intervals of a week. Several pieces of literature were sent to each group. One week after the second piece, a salesman called on the prospect, offering engineering service on air-conditioning problems.

Better prospects were then turned over to the cooperating group of air-conditioning equipment manufacturers, who were then allowed to close the sale. Similar campaigns will be conducted during 1936, according to J. F. Gaskill, manager of Philadelphia Electric Co.'s industrial sales department.

Electrical Association of Philadelphia also sent out a 36-page brochure, depicting the progress and acceptance of air conditioning in the city, with photographs of outstanding installations.

Baltimore Has 79 Installations

Baltimore installations for the nine months totaled 79, compared with 149 for all years prior to 1935. Offices in the city showed the greatest number of applications during the period, with 17 for a total of 167 hp. Residential installations totaled 9, compared with 14 in previous years.

Greatest gain was in the drug and confectionery field, where 12 installations doubled the total number in all years before 1935. Six department stores also put conditioning systems into use, for a total of 540 hp. This is only one less than the total number previously installed.

Theaters recorded the greatest horsepower load, the 11 installations in this field totaling 633 hp. Nine systems were installed in the city's restaurants, for a total horsepower of 281.

Trend in the city, as evidenced by the installations, is toward the use of multiple units of direct-expansion equipment to handle applications from 10 to almost 200 tons, reports John deB. Shepard, air-conditioning representative of Consolidated Gas Electric Light & Power Co. of Baltimore.

An example of this trend is in the utility company's first and mezzanine floors, conditioned this year. The space is conditioned by four separate direct-expansion systems, installed by four different contractors. The division, made partly as a matter of engineering expediency and partly as a matter of policy, is entirely practical, Mr. Shepard says.

Growth of air conditioning in Baltimore is natural, Mr. Shepard says, and is proceeding along logical lines. Contractors are competent, he reports, and have gained the confidence of the buying public.

Air-conditioning bureau of the utility promotes the sale of equipment by direct contact, particularly with large potential users. Engineering advice is available to all who request it. The company also publishes a magazine, "Power Periodical," in which installations are listed and described.

Late this summer, the company distributed a booklet titled "Air Conditioning Serves Baltimore," listing and explaining the uses to which air conditioning is being put in the city, and outlining its possibilities in industry and homes.

The booklet is being used in promoting sales of air-conditioning equipment during the winter season, and stresses its value as a year-'round convenience.

Year-'Round Business in Rochester

Rochester, N. Y., is another city which has discovered that air conditioning is a year-'round business rather than a spring and summer activity.

Installations for the first nine months of the year totaled 26, compared with 36 in all the years prior to 1935.

Business this fall has included a 100-hp. addition to a ventilating system, and an 18-hp. year-'round installation in one of the city's banks, reports K. B. Castle, Jr., engineer in the industrial department of Rochester Gas & Electric Corp.

Before the end of the year, two or three additional installations, totaling well over 100 hp., are expected to be made, Mr. Castle says. Several other companies in the city have also included appropriations for air conditioning in their budgets for 1936, he states.

Residences led the field in the numerical side of the nine months total, with eight installations reported against only three in all previous years. Another field to show an increase was retail stores, which reported four installations, compared to three prior to 1935.

One newspaper office was conditioned during the period, the installation totaling 110 hp., and two offices, totaling 68 hp., were also equipped. A novel installation, in a private telephone exchange in the city, was also reported.

Activities by the utility during the year have included air-conditioning meetings, speeches by engineers before civic organizations, and direct sales work. Two engineers devoted 80 per cent of their time to this work, with the assistance of a third man some of the time.

The utility also got out a folder on air-conditioning installations made in the city to this year, which it distributed among potential buyers of conditioning equipment. Local newspaper advertisements were also sponsored by the company. The utility itself does no merchandising, but offers consultation service to customers who wish it.

Baltimore Reports 79 Installations

	Prior to 1935 No.	Prior to 1935 Hp.	1935 (9 Mos.) No.	1935 (9 Mos.) Hp.	Total Oct. 1, 1935 No.	Total Oct. 1, 1935 Hp.
Barber Shops—Beauty Parlors	5	39	..	..	5	39
Drug & Confectionery Stores	6	95	12	142	18	237
Department Stores	7	888	6	540	13	1,428
Food Stores	5	20	1	16	6	36
Public Buildings	4	400	2	20	6	420
Hospitals	4	47	1	5	5	52
Industrial	9	494	1	110	10	604
Restaurants, etc.	18	310	9	281	27	591
Offices	26	220	17	167	43	387
Banks and Brokerage Houses	8	478	..	..	8	478
Residential	14	24	9	17	23	41
Specialty Shops	12	118	7	103	19	221
Theaters	21	2,358	11	633	32	2,991
Miscellaneous	7	90	3	168	10	258
Total	**146**	**5,581**	**79**	**2,202**	**225**	**7,783**

"Two of the best friends I've got are

EXTRA DRY ESOTOO VIRGINIA SMELTING (Liquid Sulphur Dioxide)

and

V-METH-L VIRGINIA SMELTING (Virginia Methyl Chloride)

. . . says the Service Man

And that's the opinion of thousands of Service Men, the country over! They have complete confidence in these two perfected refrigerants, which they get promptly from our 66 convenient distribution-points.

EXTRA DRY ESOTOO is as pure, as uniform, as human skill can make it. All moisture is removed by our patented production process. As refined and sold by us, Virginia Methyl Chloride (V-METH-L) contains a minimum of moisture and acidity. Ideal for household and commercial refrigeration.

The coupon—now!

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WEST NORFOLK, VIRGINIA

F. A. Eustis, Sec'y, Virginia Smelting Co., 131 State St., Boston, Mass.
Send me the literature I have checked. I am interested in receiving any additional literature on Electrical Refrigeration you may issue from time to time.

☐ Folder: Extra Dry ESOTOO (Liquid Sulphur Dioxide) ERN-12-11-35
☐ Folder: V-METH-L (Virginia Methyl Chloride)
☐ Folder: Transferring from large to small cylinders
☐ Circular: Physical properties of various refrigerants
(Write name and address in margin)

Mail Coupon Now!

Air-Conditioning Dealer In Baltimore Moves

BALTIMORE—The Air Conditioning Carey, Inc., local dealer for Frigidaire air-conditioning equipment, has moved to new quarters at 21 S. Charles St. Former quarters were in the Candler building.

In addition to its Frigidaire set-up, the concern also distributes the Harris humidifier and Fluid Heat oil burners.

Campana Builds $600,000 Air-Conditioned Plant

CHICAGO—Campana Corp., manufacturer of beauty products, is planning construction of a new $600,000 fireproof, air-conditioned manufacturing plant on a site halfway between Geneva and Batavia.

Buildings will cover approximately four acres on the west side of Lincoln Highway. The location has a frontage of nearly 500 feet, and the buildings and gardens will occupy 16½ acres.

Tabulated Reports of Air-Conditioning Installations in Four Cities for First Nine Months of 1935

Washington, D. C.

	Prior to 1935 No.	Prior to 1935 Hp.	1935 (9 Mos.) No.	1935 (9 Mos.) Hp.	Total Oct. 1, 1935 No.	Total Oct. 1, 1935 Hp.
Bakeries	4	46½	..	..	4	46½
Banks	..	..	1	25½	1	25½
Beauty Shops	2	13	1	11	3	24
Bowling Alleys	1	3	1	15	2	18
Candy Mfg.	1	3	..	..	1	3
Churches	1	48	1	61	2	109
Dept. Stores (Total & Partial)	8	409¼	6	1,097	14	1,506¼
Dress Shops	1	8½	4	49	5	57½
Drug Stores	4	58	5	147½	9	205½
Exhibits and Displays	6	21¼	..	..	6	21¼
Five & Ten Cent Stores	3	303	3	216	6	519
Funeral Parlors	1	15	1	12¼	2	27¼
Fur Shops	3	28½	2	2	5	30½
Grocery Stores	1	3	..	..	1	3
Haberdasheries	1	6	1	11½	2	17½
Hospitals	2	118	1	43½	3	161½
Hotel Dining Rooms & Cocktail Rooms	10	711	6	117¼	16	828¼
Hotel Sleeping Rooms	1	51	1	108	2	159
Jewelry Stores	..	..	6	50¼	6	50¼
Leather Goods	..	..	1	23½	1	23½
Libraries	1	28	..	..	1	28
Linen Stores	..	..	1	6	1	6
Market Spaces	2	3	1	1½	3	4½
Meat Processing	1	16½	..	..	1	16½
Millinery Shops	..	..	1	8½	1	8½
Office Buildings	3	1,082½	2	634¾	5	1,717¼
Opticians	1	2	..	..	1	2
Printing Establishments	2	90	..	..	2	90
Private Offices	17	43¼	20	109½	37	152¾
Radio Studios	1	10	1	2¼	2	12¼
Residences	24	53½	35	47¾	59	101¼
Restaurants	26	653¼	17	267¾	43	921
Shoe Stores	6	42½	8	93½	14	136
Theaters	5	2,032	5	381	10	2,413
Wine and Liquor Stores	1	2	..	..	1	2
Totals	**140**	**5,904½**	**132**	**3,542¾**	**272**	**9,447¼**
Federal Government	37	14,652½	19	3,489¾	56	18,142¼
Totals	**177**	**20,557**	**151**	**7,032½**	**328**	**27,589½**

Chicago

	Prior to 1935 No.	Prior to 1935 Hp.	1935 (9 Mos.) No.	1935 (9 Mos.) Hp.	Total Oct. 1, 1935 No.	Total Oct. 1, 1935 Hp.
Banks	8	1,252½	..	..	8	1,252½
Brokers and Exchanges	8	762	..	..	8	762
Beauty Shops	5	67¾	7	46½	12	114¼
Churches	3	160	1	7	4	167
Civic Buildings	1	116½	..	..	1	116½
Clubs	4	359	..	..	4	359
Dance Halls	4	465	..	..	4	465
Doctors and Dentists	4	3½	11	7¾	15	11¼
Drug Companies	8	169¾	11	97¾	19	267½
Hospitals	7	41½	6	41¾	13	83¼
Hotels	22	3,406	2	148	24	3,554
Industrial						
Bakery	18	303	1	1½	19	304½
Candy	24	3,055	4	224¾	28	3,279¾
Printing	19	2,100½	5	129½	24	2,230
Miscellaneous	19	1,141	7	102½	26	1,243½
General Offices & Buildings	53	6,324½	27	654¼	80	6,969¾
Private Offices	109	262½	59	74¼	168	336¾
Residences	44	72½	24	26¼	68	98¾
Restaurants	92	2,609½	47	1,003¾	139	3,613¼
Stores						
Candy	8	22½	8	13¼	16	35¾
Dept., Clothing, Etc.	27	1,501	26	506½	53	2,007½
Food	7	385¾	..	..	7	385¾
Miscellaneous	8	830	6	205¾	14	1,035¾
Studios	3	367	2	52¾	5	419¾
Undertakers	10	102¼	11	109	21	211¼
Theaters	103	16,208	32	1,802½	135	18,010½
Totals	**618**	**42,088½**	**297**	**5,246¼**	**915**	**47,334¾**

Rochester, N. Y.

	Prior to 1935 No.	Prior to 1935 Hp.	1935 (9 Mos.) No.	1935 (9 Mos.) Hp.	Total Oct. 1, 1935 No.	Total Oct. 1, 1935 Hp.
Industrial Plants	10	22,135	2*	126	11	22,261
Offices	..	..	2	68	2	68
Office Buildings	1	188	..	..	1	188
Theaters	4	1,274	..	..	4	1,274
Restaurants	4	136	3*	39½	6	175½
(In Hotels)	1	23	1	11	2	34
Stores	3	239	4	186¼	7	425¼
Radio Studio	1	4	..	..	1	4
Offices	3	4	2	2½	5	6½
Library	1	265	..	..	1	265
Bank	1	11	1	8¼	2	19¼
Newspaper	..	..	1	109¾	1	109¾
Telephone Exchange	..	..	2**	32¾	2	32¾
Residences	3	3	8	18¼	11	21¼
Totals	**32**	**24,232**	**26**	**602¼**	**56**	**24,884¼**

*One of these being an addition to previous plant.
**On private exchange.

Philadelphia

	Prior to 1935 No.	Prior to 1935 Hp.	1935 (9 Mos.) No.	1935 (9 Mos.) Hp.	Total Oct. 1, 1935 No.	Total Oct. 1, 1935 Hp.
Apartments (Commercial Contracts)	6	4.0	..	..	6	4.0
Auditoriums	3	563.0	..	..	3	563.0
Bakeries	8	299	1	5.0	9	304.0
Banks	6	440	..	..	6	440.0
Breweries	2	99	..	..	2	99.0
Buildings—Office	1	2,275	..	350.0	1	2,625.0
Candy Mfrs.	12	1,271	5	175.3	17	1,446.3
Chemists	5	90	3	8.5	8	98.5
Cigar Mfrs.	9	950	..	107.0	9	1,057.0
Country Clubs	1	3	1	12.5	2	15.5
Funeral Parlors	6	45.2	1	7.5	7	52.7
Hospitals	4	120.0	..	..	4	120.0
Leather Mfrs.	2	238.0	..	..	2	238.0
Meat Packers	5	126.0	1	6.0	6	132.0
Miscellaneous Commercial	5	320.8	4	1,768.5	9	2,089.3
Miscellaneous Industrial	5	73	5	97.3	10	170.3
Museum	1	100	..	15.0	1	115.0
Offices, Board Rooms, Etc.	47	282.5	10	149.6	57	432.1
Printers—Paper, Etc.	6	87.0	1	75.0	7	162.0
Residences	37	56.0	24	61.7	61	117.7
Restaurants	31	1,017.4	15	432.3	46	1,449.7
Schools	26	466	2	32.0	28	498.0
Stores—Retail	31	867.6	20	694.3	51	1,561.9
Stores—Department	3	2,042	..	..	3	2,042.0
Storage	1	30.0	4	54.0	5	84.0
Studios	2	107.3	..	..	2	107.3
Textile	15	698.0	1	170.0	16	868.0
Theaters	29	4,574.0	10	419.0	39	4,993.0
Total	**309**	**17,244.8**	**108**	**4,640.5**	**417**	**21,885.3**

Note: During the first nine months of 1935, six additional air-conditioning installations were made on private plants in this territory. These installations totaled 445 hp.

Health Propagated By Air Conditioning Dr. McConnell Says

NEW YORK CITY—Because air conditioning is so comparatively new, it is difficult to obtain case histories for statistical records or authentic, proven medical research to show just how it is beneficial to human well-being, but nevertheless air conditioning has demonstrated that it propagates health in a number of ways, stated Dr. W. J. McConnell, Industrial Health section, Metropolitan Life Insurance Co., in addressing the A.S.R.E. here last week.

Dr. McConnell spoke on "Investigations of the Health Aspect of Air Conditioning."

"Our inability to define 'health' or 'disease' precisely makes it hard to define what conditions are best for health," Dr. McConnell told his audience. "Individuals react differently to a similar condition, and age, health, and the ability to adapt oneself to one's environment must be taken into account.

"Statistical health charts show that in the temperate zone there are two periods most unfavorable to health. The first of these is during the months of January, February, and March, and the second from the middle of July to the middle of September.

"Of these the period where the heat is intense is more dangerous, because at present there is not so great a protection against it."

The speaker stated that Dr. C. A. Mills of the University of Cincinnati had found that in the cool, stormy regions, man's energy is greater than in a stagnant, humid, and hot climate, where he is sluggish in his activity.

"The human body can be exposed to a wide range of temperature variations and retain its efficiency," Dr. McConnell declared, "if the body temperature remains constant.

"Continued exposure of the human body to high temperatures leads to fatigue, loss of efficiency, and such chronic afflictions as arthritis, muscular rheumatism, and arteriosclerosis."

Dr. McConnell told his audience that air conditioning for human health might perhaps be defined as the "provision of such an external environment that the body retains the integrity of its internal environment with a minimum of effort."

Moderate fluctuations in temperature are beneficial, said the speaker, but they should be kept within a narrow range.

Individual reactions are perhaps greater to humidity conditions than to temperatures, Dr. McConnell avers. Conditions of low humidity dry up the mucous membranes and engender respiratory diseases. High humidities make it difficult for the body to throw off heat.

Air movement should be such as to accomplish the necessary air change, but should not be such as to annoy the occupants of the room.

Dr. McConnell explained a new thermometer developed by Drs. Bailey and Parsons which shows wet bulb temperatures, dry bulb temperatures, and effective temperatures (the latter takes air movement into consideration).

Another new way of measuring temperature conditions, especially as they apply to the human body, is the "personal climate" thermometer of Dr. C. P. Yaglou of Harvard. With this thermometer Dr. Yaglou takes the temperatures *under the clothing* of people.

"Current opinion seems to indicate that optimum conditions for human beings are an effective temperature of 66° F. in winter, and 71° F. in summer, with 25 linear feet per minute air motion and relative humidities of from 35 to 60 per cent, according to inside and outside temperature conditions," declared Dr. McConnell.

"In summer, the temperature differential should not be more than 10° or 12° F.

"Ineffective air conditioning wrongly controlled is worse than no conditioning at all.

"For the treatment of particular diseases, air conditioning has been shown to be good for nephritis, hay fever, malarial fever, allergic diseases, and others.

"Preliminary investigations by Drs. Kerr and Lagen of the University of California medical school show that the transmissibility of the common cold is impossible under controlled environmental conditions."

Dr. McConnell told his audience that there had been no evidence to prove that industrial workers laboring in air-conditioned plants are benefited in the relatively short time (6 to 8 hours) that they are exposed to controlled environmental conditions, Dr. McConnell explained that he meant "benefited" in the sense of prevention of disease, etc.

"In data taken from our own offices, one being air conditioned and the other not, we could find no great difference in the number of colds which the employees of our office caught during the winter as compared to those in the other office," Dr. McConnell averred.

Cooling Surfaces Best Deodorizers, Drinker Tells Engineers

NEW YORK CITY—Cooling surfaces in air conditioners, particularly spray-type dehumidifiers, constitute the best deodorizers in many air-conditioning applications, declared Dr. Philip Drinker of the Harvard School of Public Health in addressing the A.S.R.E. convention here last Wednesday afternoon.

Dr. Drinker outlined the results of experiment and research which he and his associates have conducted on the control of odors.

"Engineers are prone to look too much to the medical profession for *reasons* for doing things," asserted Dr. Drinker.

"There is not much physiological basis or reason for controlling mild odors. Of the three kinds of mild odors, none have physiological significance.

"An engineer doesn't need medical advice to know that a room smells."

Dr. Drinker stated that mild odors under ordinary conditions fall under one of three types as follows:

1. *Foodstuffs odors*: Come from the handling and cooking of foodstuffs, and the disposal of waste foods.
2. *Body odors*: Resulting from sensible and insensible perspiration. "The aroma of untaken baths" is another way of describing it, Dr. Drinker said.
3. *Tobacco smoke and cosmetics.*

Physiological sensitivity varies in relation to "quantities" of the odors, but the quantity is hard to measure, Dr. Drinker pointed out.

The amounts of foodstuffs odors which are detectable can be described, Dr. Drinker explained, by referring to chemical analyses to which they are analogous.

For example, the ammonia and hydrogen sulphide groups are detectable in the relation of one part to 50 million, acetic acids in two parts to a million, butyric acid in two parts to a billion, camphor in 2/100 of a part per billion, mercaptans, 12/100 part per billion.

"Those odors in the ammonia group are soluble in water and are removable by air washers," said Dr. Drinker.

"Substances like camphors are not soluble and can be removed only by dilution (by raising the c.f.m.).

"Body perspiration odors are taken out by dehumidification. This is one reason for employing increased cooling capacity."

With reference to tobacco smoke, Dr. Drinker stated that while it is the visible smoke that hurts the eyes, that the gas which causes the offensive odor is invisible.

"The visible part of tobacco can be removed by very high grade filters," said the speaker, "but the 'smelly' part is not caught by air washers, and is not helped by ozone. It can, however, be handled by dilution or by passing the air through charcoal."

Dr. Drinker told the convention that his associate, Dr. C. P. Yaglou, has classified odors with regard to their strength as follows: 1. Detectable, 2. Moderate, 3. Strong or objectionable, 4. Very strong, 5. Nauseating.

"Odors of the strength of classes 3, 4, and 5 must be handled in some way by the air-conditioning system," Dr. Drinker declared.

"Changes in any objectionable stimulus proceed in logarithmic order," he said. "Usually the increase must be about 40 per cent greater before the odor can be said to have moved from one class to the next."

Dr. Drinker related the interesting experiments which had been conducted with a subject who was placed in a coffin. Air was vented over his face only, and these experiments demonstrated that detectable odors from humans do not come from ordinary exhaled breath, but from body odors.

"Odor control can be accomplished in air-conditioning systems with the introduction of 16 c.f.m. of fresh air per person, the amount or extent of recirculation being negligible, and hardly mattering at all," said Dr. Drinker, basing his statement on certain research conducted by Dr. Yaglou.

"With cooling, especially with the spray type dehumidifier, less fresh air is needed.

"Size of the space in which the odor is confined is a factor in the determination of fresh air needed to dilute it."

In discussing the various types of deodorizers, Dr. Drinker stated that charcoal will adsorb practically all organic vapors. The matter of velocities is a problem when using charcoal, as the air cannot be passed over it at too great a speed. Velocities up to 130 f.p.m. are possible with charcoal, experiments have shown, the speaker said.

Concerning tobacco smoke, Dr. Drinker said that filters can be made which will remove 50 per cent of the tobacco smoke every time the air is passed through them, so that with constant recirculation a rather effective removal is secured.

There is a mistaken notion about how ozone acts, said Dr. Drinker. It oxidizes odors, rather than masking them, as is commonly thought.

Dr. Cragoe Stresses Importance of Safety In Air Conditioners

NEW YORK CITY—"Manufacturers in their zeal to get business should not neglect the matter of safety," Dr. C. S. Cragoe, senior physicist, U. S. Bureau of Standards, told A.S.R.E. conventionites here last week.

"One major catastrophe in which there were fatalities might seriously impair the program of the industry overnight," said the Bureau of Standards official.

Dr. Cragoe said that incompetent or inexperienced operators are one of the big problems which loom before the air-conditioning industry.

The speaker told how makeshift units and installations might bring disastrous results, tracing vividly the manner in which such an installation might be set up to invite disaster.

Concentrations of refrigerants should be kept within the accepted standards of safety, said Dr. Cragoe.

Those handling the installation of equipment should not forget the many possibilities of danger that may arise, the speaker said. An installation may be installed in such a place as not to be conducive to safety, while in other places it would engender little, if any, danger.

Air Conditioning Installed In 4 Rooms in Capitol Of W. Virginia

CHARLESTON, W. Va.—The governor's office, reception room, Museum, and archives of the West Virginia state capitol building have been equipped with Kelvinator year-'round air conditioning.

The state legislature is planning to air condition the entire building some time in the future.

Construction of the $10,000,000 building makes it especially adaptable to air conditioning. The masonry walls are 40 inches thick, and installation is aided by existing ducts and fluted walls.

Local Merchandising Problems Studied in G-E Conferences

BLOOMFIELD, N. J.—To study local merchandising conditions as a preliminary to its 1936 merchandising program, the air-conditioning department of the General Electric Co. is currently holding a series of eight regional meetings with dealer representatives and district sales managers.

Conferences, from Dec. 2 to Dec. 20 inclusive, are scheduled for Boston, Syracuse, New York City, Washington, Columbus, Chicago, Dallas, and Atlanta.

J. J. Donovan, manager of the air-conditioning department of the General Electric Co., heads the group of company officials, which includes E. B. Shiddell, assistant to the manager; A. C. Roy, advertising and sales promotion manager; W. A. Scherff, manager of oil furnace sales; E. J. Opal, manager of gas furnace division; Elliott Harrington, engineer; and R. S. Thurston, sales engineer.

How Conditioners Fit into Room Shown In Booklet

MANSFIELD—That the comforts of air conditioning in the home can be obtained without sacrificing room appearance is demonstrated in pictures of an artistically appointed living room, bedroom, den, dining room, and hallway equipped with Westinghouse cabinet cooling models, in a promotional booklet just released.

Copy explains how air conditioning can bring "health and comfort" to the home, while pictures of the cabinets with a natural wood or Micarta finish show how attractively it can be done.

Operation of a unit system is explained in a sketch of a cross section of a house in which the dining room and a bedroom located over it are cooled by equipment installed in the basement.

Pictured in the book also is the Westinghouse Mobilaire summer air-conditioning unit, and the manner in which this unit can be moved from room to room.

Caruso Restaurants Cooled by Lipman

NEW YORK CITY—Four of the Caruso chain of restaurants, located at 125 West 45th St., 40 West 33rd St., 224 West 34th St., and 19 East 59th St., have been equipped with Lipman air-conditioning systems.

These restaurants, and two more of the chain, have been users of Lipman commercial refrigeration equipment for the past 10 years.

Typical of these installations is the one in the 34th St. restaurant. Conditioning equipment consists of three Lipman model 1007 Freon refrigerating units.

Lipman commercial refrigerating equipment in use here includes a model 103, connected to a three-compartment box; a model 153, which cools a beer container; two back-bar refrigerators, a short order box, and a model 73 Lipman, connected to an 85-gallon Lipman pressure-type water cooler.

Another restaurant recently equipped with a Lipman air-conditioning system is the Lobster Grill at 145 West 45th St. Two model 1507 Freon machines supply air conditioning to this lobster and sea food restaurant, which has a seating capacity of 300.

Greensboro Shoe Mart Buys York System

GREENSBORO, N. C.—An air-conditioning system, consisting of a York C-600 air-conditioning unit and a 5-hp. Freon machine, was recently installed in the Shoe Mart here by Venco, Inc., local York distributor.

Train Conditioning System Described to Engineers

CHICAGO—The Chicago section of the American Society of Refrigerating Engineers held its regular monthly meeting yesterday (Dec. 10) at the Hamilton Club. Feature of the evening was a talk by M. P. Winther of Pullman Standard Car Mfg. Co. on "The Streamliner and Air Conditioning."

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Only "Genuine Detroit" Thermostatic Expansion Valves incorporate the advantages of the gas charged power element such as—

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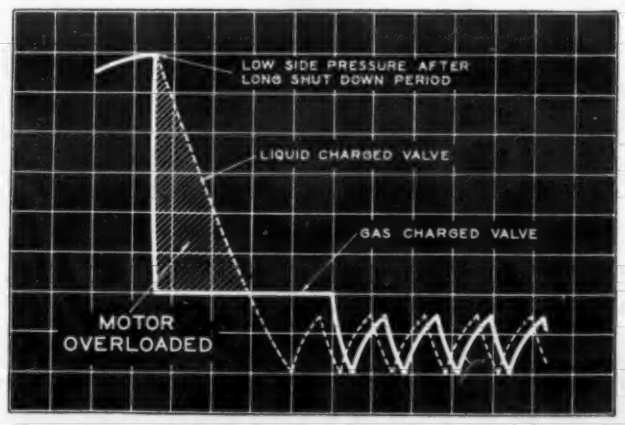

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AIR CONDITIONING

Clearer Understanding of Performance Necessary for Proper Selection of Fans, Berestneff Claims

NEW YORK CITY—A clearer understanding of fan performance factors on the part of both the manufacturer and installation engineer is necessary if proper selections of blower equipment are to be made for air-conditioning work, declared A. A. Berestneff, research engineer, Carrier Engineering Corp., Newark, N. J., in speaking before the opening technical session of the A.S.R.E. meeting here last week on "Fan Selection and Nomenclature."

Although fans have been used for a long time and developed to a high degree of perfection, the basic concepts of fan performance and characteristics are often but poorly understood," Mr. Berestneff explained.

To select a fan properly, he believes it necessary to establish and use the different terms needed to express those concepts. In 1923, the National Association of Fan Manufacturers, in collaboration with the American Society of Heating and Ventilating Engineers, published a "Standard Test Code for Disc and Propeller Fans, Centrifugal Fans and Blowers."

"This code helped the situation considerably," Mr. Berestneff reported. "At that time it was satisfactory because air handling installations were not so complicated as they are now.

New Problems in Fan Selection

"From this newer complication of practice new problems in fan selection arose, which cannot be properly solved by 1923 Code alone. Recently, the American Society of Mechanical Engineers took up the subject through its Committee on Power Test Codes. The result of the work of this committee is the 'Test Code for Centrifugal Compressors, Exhausters, and Fans,' of which Part 1, on compressors and exhausters, was published this year. Part 2, on fans, is being prepared.

Mr. Berestneff hopes that the forthcoming codes will be complete enough that every engineer will find answers to all questions in connection with the problem of fan selection. As matters now stand, every engineer has to build up his own concept of the subject, and use his own judgment in applying available data on performance for proper selection of fans.

The speaker explained that a fan is selected by its characteristics, among which the pressure or head characteristics are most important. These heads are the total and static pressures developed by the fan. They are expressed in terms of total, static, and velocity pressures as applied to air flow at the fan inlet and outlet.

"Enough has been said about the definitions of pressures or air flow," he said. "Any one of several current definitions explains the physical meaning of the corresponding phenomenon. It is to be remembered that the true values of total and static pressure are their absolute values.

"The values that are usually measured with a U-tube open to atmosphere, are *gauge* or 'reading' values. The absolute value may be higher or lower than the atmospheric pressure, the gauge value being correspondingly positive and negative in sign. There is no difference in using the absolute value or gauge value if the latter is taken with the proper sign.

Mr. Berestneff gave the following definitions as adequate for present use:

Static Pressure (h_s) at any point or section of air flow is the pressure of compression. It is proportional to the potential energy of the air at this point, and is measured by a static tube or piesometer.

Velocity Pressure (h_v) at any point of air flow is the pressure equivalent to the velocity at this point or section. It is proportional to the kinetic energy of the air, and is measured by a combined Pitot tube, by an orifice, or by a nozzle.

Total Pressure (h_t) is the sum of the static and velocity pressures. It is proportional to the total energy of the air and is measured by an impact or "total" tube.

In considering the total and static pressures developed by the fan, or "fan total and static pressures (H_T and H_s), the speaker said that the basic difference between the total and static pressures as applied to any point (or section) or air flow and the fan total and static pressures must be considered first.

Fan Total and Static Pressures

He then explained that unlike the total and static pressures at a point or section of air flow, which, properly speaking, are the absolute values of pressures at this point, the fan total and static pressures are the differences between some pressures at the two points, or sections, before and after the fan. These two sections should be most logically the fan outlet and inlet.

"So far there have been no difficulties in establishing a definition for fan total pressure," he continued, "which logically follows from fan duty, namely, to overcome all losses inside the duct system and to create the desired velocity of discharge at the end of the line; the second item might be also considered as a loss, but outside of the system.

"To compensate for the total pressure drop due to all these losses, the fan has to create a certain difference in total pressure levels at the fan inlet and outlet.

The difference in total pressures at the fan outlet and inlet is therefore called "fan total pressure," and written:

$$H_T = h_{td} - h_{ti}$$

(in the case of the fan; subscript i=inlet, subscript d=outlet.)

Contrary to the fan total pressure, Mr. Berestneff said the conception of fan static pressure is arbitrary.

Three definitions of H_s are found in the literature. He first considered two of them:

$$H_s = h_{sd} - h_{si} \quad (1)$$

$$H_s = h_{sd} - h_{ti} \quad (2)$$

The first one credits the fan with the velocity pressure at the fan inlet. In case the latter is greater than the velocity pressure at the fan outlet, this H_s is greater than H_T. Because the H_T is all we require from the fan to move the air, anything that is larger than H_r looks rather queer.

However, he explained that this reason alone would not be sufficient to exclude logically the use of the first H_s definition, because it might seem just as queer not to credit the fan with any velocity pressure at all, or only with a part of it as one does while accepting some other definition of H_s.

Mr. Berestneff reported that it is in the history of fan development rather than in logic that one can find an explanation of why this kind of H_s should not be used. None of the fan catalogs are based on this definition and it is thus of no use for fan users.

The second definition of H_s may be written this way:

$$H_s = h_{sd} - h_{ti} = h_{td} - h_{vd} - h_{ti} = H_t - h_{vd}$$

or, in other words: Fan static pressure equals fan total pressure minus the velocity pressure at the fan outlet.

Some writers, he related, attempt to prove that the velocity pressure at the fan outlet cannot be considered as useful energy and, therefore, the fan should not be credited with this part of energy. Others are of the opposite opinion.

From this the third definition of H_s follows:

$$H_s = H_t - h_{ve} \quad (3)$$

Aside from the clear concept of H_s, Mr. Berestneff indicated one fact more which the fan user has to know about: losses of pressure in air flow take place outside the fan, in the duct system, as well as inside the fan itself.

The inside losses, he said, are influenced by fan design, including such details as the shape of the fan inlet and outlet, and by the character of air inflow and outflow. While the character of air discharge into a duct system does not seem to Mr. Berestneff to influence the performance of the fan to any considerable extent, the character of the air intake to the fan does influence performance considerably, he contended.

To explain this phenomenon, Mr. Berestneff considered an example of a fan with a cylindrical inlet ring sucking from atmosphere (or from any space where the approach velocity of air is negligible).

Air Contracts and Expands

In this case, he reported, some "vena contracta" would be observed inside the fan just after the ring. While entering the wheel the air is expanded again, which affect is accompanied by a certain loss.

If now a duct, say of the same section as the inlet ring, is attached to the latter, the condition of air flow inside the fan will be essentially changed, he continued. The vena contracta and the corresponding losses will disappear or be greatly reduced. Therefore, he reasoned, if the power input to the fan is assumed to be the same, a larger portion of this power will be available for doing outside work and the fan characteristics, both H_t and H_s, indicating the energy available for the outside work, will be more favorable.

This, Mr. Berestneff explained, illustrates the above mentioned fact that, generally speaking, the fan performance and characteristics, that is H_t and H_s, depend upon the fan arrangement. It is evidently because of this fact, he said, that we found the following statement in the 1923 Code: "Tables based on such tests (for exhaust fans) shall be clearly marked as for exhaust systems only and shall not be used for other purposes."

Evidently, he concluded, the reverse statement is also true, which means that fan tables based on tests for supply fans should not be used for exhaust system or for booster arrangements (the latter being similar in this respect to the exhaust arrangements).

As for the application of the above material, Mr. Berestneff said, "The fan user should always have in mind this phenomenon and get information for just what kind of arrangement the H_s data are tabulated in the catalog. If it is not the arrangement he is going to use, he must find out just how the tabulated data would have to be changed to be applied in his case.

"Information on this subject should appear in fan catalogs. If the influence of arrangement on fan characteristics is negligible, it should be so stated. If not, proper correction factors should appear."

The term resistance, Mr. Berestneff explained, is often used in selection of fans for a certain duct system. A typical specification reads: "The fan shall have a capacity of ..... c.f.m. against ..... inches resistance pressure."

If the fan is used as a blowing fan, the resistance is usually understood as h_s at the fan outlet, which expressed in gauge reading is the H_s. But if the fan is used as a booster, "resistance pressure" is sometimes conceived to be different from H_s, which should be

$$H_s = H_T - h_{vd}$$

As he had already stated, the H_T is required to overcome all losses inside the duct system and create the velocity of discharge. In some books, the speaker maintained, one can find that the system resistance is the sum of all losses occurring inside the duct. If so, the resistance pressure in this case is the sum of losses or $H_T - h_{ve}$ at system discharge. This is recognized as Mr. Berestneff's third H_s which under circumstances can be quite different from the accepted (second) H_s.

User Should Require Explanation

To insure definite use of the terms resistance, resistance pressure, and the like, Mr. Berestneff suggested that fan users require an explanation of these terms, in terms of h_t, h_s, and h_v before and after the fan, and then to find out whether the explanation given agrees with the H_s No. 2. He saw no real necessity of using such terms as resistance pressure and maintained resistance, because they are vague, not defined in any code. Furthermore, the three terms total, static, and velocity pressures, or heads, as applied to air flow, or to a fan, are entirely sufficient, he contended.

An important question discussed by Mr. Berestneff concerns what we call fan outlet and inlet.

The 1923 Code says: "Fan discharge or outlet is the place provided for receiving a duct through which air leaves the fan. Fan inlet is the place provided for receiving a duct through which air enters the fan."

Mr. Berestneff believed this definition to be very good, because it separates the fan from the duct system, which is so important for fan users. Contrary to that, Stuart recommends using as a reference sections distant from the proper fan inlet and outlet, his reason being that it is sometimes difficult to measure or calculate the corresponding pressures just at the fan inlet and outlet.

It is true, the speaker admitted, that it is difficult to take direct measurements, but it is possible to make a determination of those pressures by measurement at some convenient distance from the fan, and by computation by adding the losses between the reference section and the fan. The character and values of different losses are fairly well known at present, he said, so that the calculation will give a sufficiently accurate result, as suggested by the 1923 Code.

If this is not done, and the fan in its performance is not distinctly separated from the duct system, difficulties will arise, he maintained. In proof Mr. Berestneff offered this example:

"We often have a duct bend just after the fan outlet (within the 7 ft. recommended by Stuart). If this run of 7 ft. is included in fan characteristic, the fan user may not take this bending into account.

"On the other hand, the fan manufacturer, bound by the test on the straight duct, will not bother about this bend either, although the H_s measured at the 7 ft. distance with the bend will be entirely different from the one with the straight duct. As a result, the bend and the corresponding additional loss will be forgotten."

As an illustration, of procedure in fan selection, Mr. Berestneff gave the following:

"Take the booster arrangement where the ducts are attached to both sides of the fan. From our definition of the H_s (if this is the static pressure that we use for selection of the fan) as the difference between h_{sd} and h_{ti}, it is evidently these two quantities which have to be determined.

"For a given duct system, these pressures are at the same time h_s at the beginning of discharge duct, and h_t at the end of the suction duct (going in the direction of air flow). (For ducts subscript b=beginning, subscript e=end.)

"There are two methods of determining the value of h_{sd}. One starts with h_s at the end of the supply duct, where it may be assumed equal to the atmosphere.

"Going back and taking in consideration both the pressure losses inside the duct and the eventual conversion of h_s and h_v or vice versa, between different sections, we arrive at the value of h_s at the beginning of the supply duct which is h_{sd}.

"The other method is easier. For better understanding of what it is based on, one must keep in mind the following:

"'The losses between any two sections, taken on the suction or the supply side of the fan, are always measured by the difference in the h_t at these sections.'

"Considering two sections on the supply duct, one at the beginning and another at discharge end, we may write:

$h_{tb} - h_{te}$=sum of losses in supply duct.

"Consequently, to find the h_{td}, sum up all losses inside the supply duct and add h_v at the system discharge. To get the h_{sd}, subtract the h_{vd} from the above value of h_{td}.

"(Because we do not know yet what size of fan we are going to use, assume some air velocity at the fan outlet. Then, after the fan is selected tentatively, correct the h_t and h_s at the fan outlet according to the fan outlet area and the amount of air handled and recheck the fan size.)

"For h_{ti}, we may write similarly, *referring* to the suction side of the duct:

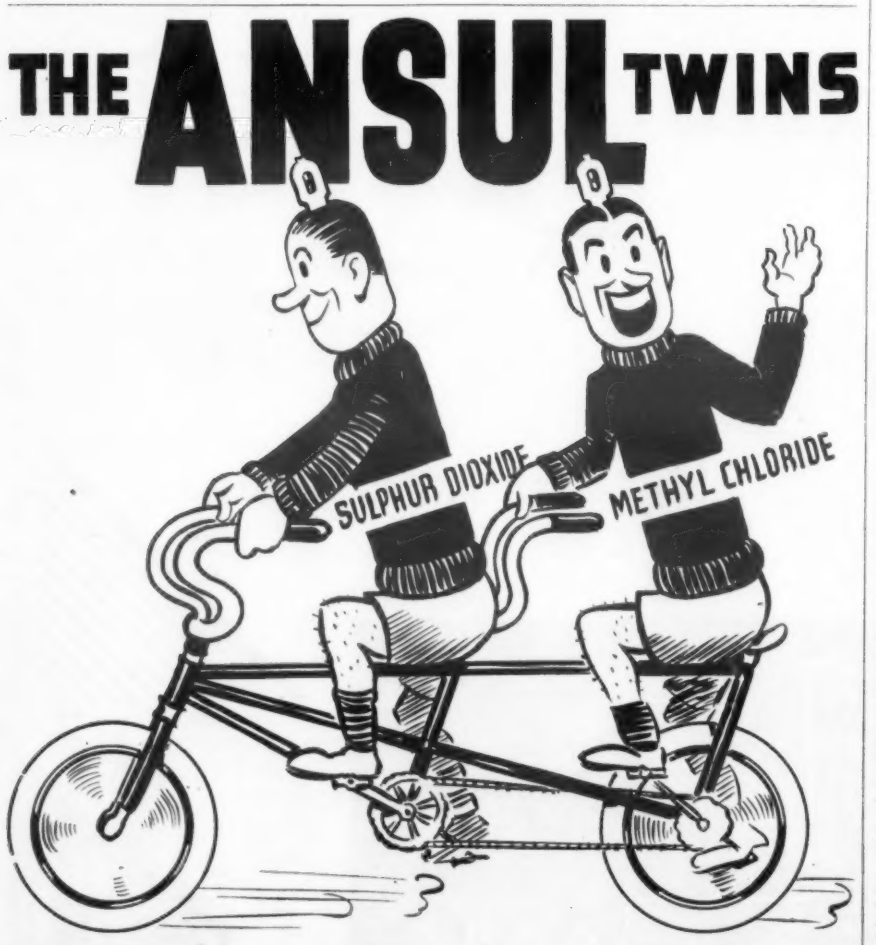
$h_{tb} - h_{ti}$=sum of the losses inside suction duct. If sucking from atmosphere, h_{tb} gauge=0. Therefore, expressed in gauge,

h_{ti}=—sum of the losses inside suction duct.

"Now it is easy to find the required H_s as:

$$H_s = h_{te} - h_{tb}$$

By the H_s and by quantity of air handled, it is easy to select a fan from catalog data. Previous to that, however, in accord with all said above, it must be made clear what these data mean and whether they are directly applicable to the case or not."



SATISFACTION

The Ideal Gift

Two weeks from today the confusion of Christmas gift-giving will be passing into files of "Finished Business—Return in 1936".

Many gifts will have been examined and quietly junked. Others on which loving care and thought have been expended will be cherished for years, regardless of intrinsic cost; welcome reminders of the donor, because they brought *Satisfaction.*

One gift that may be given away and yet retained is Satisfaction. Satisfaction is born of completely adequate performance, dependability, scientific accuracy, plus long and faithful service.

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COMMERCIAL REFRIGERATION

Armstrong Tells Importance of Refrigeration in Winery

NEW YORK CITY—How refrigeration assists in the production and marketing of wines was outlined to A.S.R.E. members at the Thursday session of their annual meeting here last week by R. M. Armstrong of the Richmond Ice Co., Richmond, Va. Four main uses of refrigeration in the winery and the cider mill were given by Mr. Armstrong as follows:

"Cooling of must during fermentation, chilling of wine to precipitate cream of tartar, cooling of dry white and red wines for carbonation in sparkling wine manufacture, and freezing of necks of champagne bottles for impurity removal."

"Dry wines," he said, "generally freeze at between 16 and 19° F., while strong fortified wines, such as port, sherry and angelica, freeze at temperatures varying around 10 to 12° F. They have a specific gravity usually of around one or higher and the writer has observed a usual specific heat of near 0.9.

"Cider will freeze, according to alcoholic concentration, at from 25 to 27° F.

"The maximum normal alcoholic content of cider is from 6 to 8 per cent by volume," he averred, "while wines seldom range above 12 to 13 per cent until fortified to 21 per cent for port and sherry. As the latter are by far the most important in volume of commerce at the present time, more is known of them than the balance of the drier wines. Champagne generally contains approximately 12 to 14 per cent of alcohol, depending upon the method of manufacture."

Cooling of Must

Mr. Armstrong claimed that in the initial fermentation of the freshly expressed must, or grape juice, during hot weather the outside heat combined with the heat of fermentation may result in temperatures of 103 to 108° F. This level, he said, will generally stop fermentation of the wine and cause what is known as a "stuck" tank.

"A stuck tank," he continued, "is very liable to contamination by disease bacteria, since the normal beneficial bacteria do not operate, and for this reason, many operators will immediately pasteurize a stuck tank, then referment it with a pure yeast culture, after cooling to 80 or 90° F. The purpose of refrigeration in must cooling is to avoid reaching a temperature above around 95° F., thereby eliminating stuck tanks."

Various methods used to accomplish this were described by the speaker. Operators unable to buy mechanical refrigeration merely 'pump over' the fermenting tank into an open barrel. Incidental aeration and the heat loss in the hose lines accounts for a small amount of cooling during recirculation, but usually this is not enough to correct any really serious condition, Mr. Armstrong contended.

Refrigeration in Finishing Room

The most successful use of must cooling in his experience, the speaker reported, was in connection with the mechanical refrigerating machinery and cooling units used in the main wine finishing processes of the plant.

He said that this is generally by means of attemporator coils in the fermenting tanks, using either brine or direct expansion ammonia, or in shell-and-tube or double pipe coolers. A multipass cooler is more satisfactory for this service, he claimed, since it is much better to bring the whole body of the wine down through a limited number of degrees than to cool a small portion through a large range and rely upon this portion to mix with the body and reduce the temperature. In general, the use of shell-and-tube or double pipe coolers was recommended, since this does not involve duplication of equipment for must cooling, and, Mr. Armstrong reported, it is a usual fact that the winery is equipped to pump large distances to the cooling equipment without loss of temperatures through the brewer's hose.

In regard to the precipitation of cream of tartar, Mr. Armstrong said: "Refrigerating engineers know from experience with quick freezing and the dewaxing of lubricating oils that a high rate of cooling results in a small crystal structure, while a slow rate gives a large crystal.

"In cold settling, the small crystal settles and drops from the body of the liquid more slowly than the large one. The same applies to crystal separation by filtration where the tartar that does not settle out is removed from the wine.

"In addition to tartar, the filter will separate out certain colloidal matters present in wine, due to the fact that while these materials will stay in the solution and pass through the filter at room temperature, at a low level they coagulate and can be filtered from the solution."

Precipitation of Cream of Tartar

Mr. Armstrong reported that tests carried out at the University of California showed that wine chilled to 30° F. did not immediately precipitate tartar, but that it deposited in diminishing quantities for a period of 10 to 14 days, at which time it was no longer economical to keep the wine in cold settling.

The same tests showed that the wine would precipitate more tartar in the same relative manner if refrigerated to 20° F. Tests made by the speaker in actual practice have corroborated the above, he claimed, and have also definitely confirmed the reference to the rate of cooling.

"The importance of slow cooling," he continued, "and the difference in the size of crystal formed is well illustrated in practice. A wine which has been well packed and is gradually chilled by cold weather in shipment may form a flaky and granular sediment as of as much as ½ in. in the bottom of the bottle.

Results with Shock Cooling

"The wine above this will be clear in general unless iron contamination or refermentation due to imperfect pasteurization has taken place. However, the discharge from a single-pass, shock-cooling, double-pipe cooler is merely a muddy liquid, indicating the fine particles in which the tartar has crystallized.

"Naturally these fine particles are much harder to filter out of the wine than the larger particles formed during slow cooling."

Referring again to the University of California tests, he said they may indicate with further experience that the best way to eliminate tartar is to freeze the wine to a thick sludge at almost freezing point. However, this involves taking out the latent heat and therefore requires considerably more cooling than the present practice of cooling to approximately 20° F.

"The most general method of cooling now in use," he continued, "involves a copper or stainless steel double-pipe single-pass cooler. In these the wine is cooled from 60 to 70° F. down to around 20° F. in a period of one to two minutes. This is a shock chilling and results in a fine tartar crystal.

Elimination by Cold Settling

"The same result is obtained in a single-pass shell-and-tube cooler or in a single-pass sump type of cooler. However, if this wine so cooled is allowed to cold settle for a period of around three weeks an entirely satisfactory tartar elimination will result. This applies to a young and green wine.

"Naturally, a wine which has had the benefit of some aging and storage and consequent loss of tartar in racking will not need such a long low temperature treatment.

"Generally, in redwood tanks from 5,000 to 10,000 gal. and larger in capacity, wine cooled to 20° F. will still frost a filter from a week to ten days following the cooling. This indicates that the wine has not heated up to over 30° F. and therefore this treatment is quite satisfactory.

"A shorter cold settling period may be obtained with either the double pipe or shell-and-tube cooler, by using a multi-pass arrangement and cooling the wine through a range of 7 to 10° F. in a passage through the cooler and gradually bringing the body of the tank down to 20° F. A cooling rate of around 5°/hr. is most satisfactory. By this method a more gradual cooling is accomplished and a larger and more easily filtered crystal results. However, this calls for an increase in pump capacity.

Mr. Armstrong averred that operators who merely cooled their wines to 20° F., then filtered them and bottled them immediately, found that this treatment was not satisfactory and was but little better than no treatment whatsoever. The settling is quite important and plays a very large part in the proper elimination of tartar.

Other methods of cooling, not so widely used as the above, the speaker pointed out, include jacketed tanks using ammonia or brine as the cooling mediums, and to a limited extent methyl chloride, wooden tanks with oval coils, and sumps in which copper cooling coils are surrounded by brine.

Double Pipe Method

"The sump method works out quite well in some cases," he said, "although it is not so practical as the double pipe units. The tanks are again not so practical due to the duplication of equipment. A normal tank cooler of 500 to 1,000 gal. has sufficient heat transfer capacity, usually of stainless steel, to allow chilling of the wine in a period of from 24 to 72 hrs.

"As against this, the unit coolers take up much less space and give outputs of from 200 to 500 gal. per hr., thoroughly cooled, or a similar amount when used in multi-pass arrangement.

"A disadvantage of the tank type cooler besides the low capacity is the tendency of winery operators to sulphur the tanks, i.e., burning sulphur tapers inside the tanks when empty. "In this way the sulphur dioxide given off condenses on the cooling coils and in combination with moisture results in weak sulphurous acid, which corrodes 18-8 alloy. One extensive installation failed due to this fact."

Glass-Lined Tanks

The jacketed tank, he claimed, must be made of some expensive metal or be glass lined, and since it also has a low output, although somewhat more than the wood tank and coil type, it is not practical purely as a refrigerating unit. When used in combination as a pasteurizer and a cooler he reported that it competes on equal terms with the shell-and-tube and an additional pasteurizer, and gives results unobtainable in either separately.

"However, the combination of hot wine at 180° F. and cold wine at 20° F. results in a corrosive condition which is quite severe. In addition to the above, the best results from a tank type unit are only obtained with the proper control of pressures and temperatures, and as this information is not generally available, the spread of this equipment has not enjoyed much progress. The speaker has found a normal heat transfer coefficient ranging from 40 to 60 overall in this type of construction."

Refrigeration is also used in the form of brine baths to freeze the necks of champagne bottles where the old French method of manufacture is used, Mr. Armstrong said in the concluding part of his address. This method is as follows:

Freezes Neck of Bottle

Brine at 0 to 10° F. freezes the neck of the bottle which is placed in an inverted position on a wood rack which allows the neck to dip into the bath. The cork of the bottle is then removed and the frozen wine and impurities blown out by the internal pressure in the bottle. In connection with this method of manufacture, a few wineries use direct-expansion, box-type coils in the fermenting rooms where champagne in bottles is undergoing its secondary fermentation. If the temperature rises to too high a level there is a tendency for the pressure in the bottle to break and explode the container, with a consequent loss of product.

Not enough attention has been paid in the winery to the proper materials of construction where contact with the wine is found, Mr. Armstrong contended.

Clouding of Wine

Iron, zinc, lead, and similar base metals cause clouding of the wine. Aluminum, bronze, and tinning are satisfactory for short time contact at low temperatures. Only silver is entirely unaffected by wine after the oxide coating is formed, but due to its high price it is usually only available as a plating. As most platings are porous, these too fail after a period of months and must be replaced.

Inconel and stainless steel, he stated, give satisfactory service for most low temperature applications, except as noted before when unusual acid conditions occur. Glass lined equipment naturally meets all requirements, but due to the high initial cost has not been widely accepted, he said.

Use of Bakelite Coatings

The speaker claimed considerable experience with the use of bakelite coatings, finding them entirely satisfactory for use with wines and all types of fruit and alcoholic products where the temperature does not exceed 275° F. and where abrasion is not severe.

But, he continued, care must be taken in its application to remove all traces of volatile matter which might later impart a taste to the wine.

Many copper cooling units are in use, Mr. Armstrong reported, giving trouble only in isolated cases. Aluminum he considers also satisfactory where it is not present in any large ratio to the amount of wine in contact with it.

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COMMERCIAL REFRIGERATION

Importance of Refrigeration in Rural Readjustment Plan Described by University Professors

NEW YORK CITY—Refrigeration is destined to play a major role in the program of readjustment and decentralization in the rural as well as the urban areas of America, said W. R. Woolrich, R. B. Taylor, and Mack Tucker, all of the University of Tennessee, in a paper read at the A.S.R.E. convention here Dec. 5.

Some of the methods of readjustment were summarized as follows:

"1. Developing and maintaining a full-time farmer, or a member of his family, on his own land, and wherever feasible for industry and related rural community services to absorb the surplus gainful workers from these farm areas. Preferably, such industries should be diversified in products manufactured and include large and small interrelated enterprises.

"2. Creating part-time farming or gardening employment for the industrial worker, especially in highly developed industrial areas. If the worker does not actually become the land owner, he is likely to look upon this type of farming as merely supplementary subsistence to be used for emergency relief.

"There is not much occasion for such a development in the southern areas. The counties of the 11 southern states have one-half of the rural white children of America. The problem involved is that of bringing sufficient industries and rural services into being in such regions as are necessary to support properly surplus workers in those rural sections.

"3. Organizing purely subsistence communities in which employed farmers or city dwellers produce necessities for their own consumption but not for sale. This movement has been reflected in the Subsistence Homestead Program.

"4. A fourth group might be encouraged in migratory tendencies. These are city workers who now have a source of income but realize that modern transportation and rural electrification permits them to migrate to farms, to carry on a "live at home" program around urban centers. This spreading out movement tends to create rural urban areas which will exercise a shock-absorbing tendency during abrupt economic changes."

In any of the four programs, the authors declared, there should be projected a practical plan of research and demonstration of uses of refrigeration for farms and rural homes.

Analysis and Research Needed

The refrigeration group, they said, has not fully realized the implications of an extensive rural refrigeration program. The farm user is not in a position to employ consulting service. His uses are widely diversified, and require rugged construction. Thus any development in this field should be based upon analysis of farm problems by organized industry. This should involve, the paper set forth, greater efforts towards:

(a) standardization; (b) reduction in cost of equipment; (c) increased adaptability of units; (d) research in the keeping of farm products under farm conditions; (e) intelligent demonstration of the uses that can be made of refrigeration; (f) a cooperative program by the manufacturer and farm organization which will make possible profitable organization, operation, and extension of community refrigeration plants; and (g) research carried on by the engineering staff of manufacturers instead of by sales agents.

Under standardization must come agreement on the requirements of the different types of refrigeration equipment for specific farm uses, the authors contended. Refrigeration equipment must be kept out of the freak class, yet made adaptable to farm use.

"Our failure to do even a mediocre job of standardization in the earlier period of milk cooler design is now a matter of history in this country," they said. "Hundreds of plants were installed at the expense of the farmer that were entirely unsuited for the job for which they were sold. In many cases he had no recourse except to pay the bill and condemn the refrigeration industry in general."

Closely associated with standardization is reduced cost of equipment, the paper pointed out. The multitudinous number of designs for smaller condensing units is largely responsible for a cost prohibitive to prospective rural American users, the authors declared.

"Adaptability is quite essential to the expansion of a rural refrigeration program," they said. "If a walk-in cooler is under construction, its general use as a household refrigerator as well as a farm cooling unit may be quite necessary.

"If it is a community plant, its adaptation to the curing of meats, the freezing of the more perishable products for long term storage, and the general use of cold storage for both fruits and seeds should be seriously considered.

"In many areas a program of research and demonstration should be promoted through the existing state engineering and agricultural experiment station laboratories to determine the nature of the storage problem in those areas in which the refrigeration program is to be extended.

"For example, the relative keeping qualities of peanut, slop, and corn fed hogs is not generally known in areas where these foodstuffs for the swine herd predominate, yet anyone who has attempted to store these three types of pork realizes widely different characteristics in the hams produced under different feeding conditions."

Reporting on a survey made by them of present farm practices in several states and in Canada, the authors said: "In general we have done a very sketchy job in introducing to rural America the practical uses of refrigeration. While in some areas there is some saturation in the use of household refrigerating units, progress in the refrigeration of farm meats, dairy products, and farm fruits and vegetables has been to date very limited.

"Demonstrations to prove the practicability of using a mechanically refrigerated cooler on the farm will do much to correct this condition. It is such economic uses of refrigeration that will help to pay off farm mortgages and increase the net rural incomes.

"While the refrigeration industry has done a commendable job in convincing the rural housewife that a household refrigerator originally designed for her city cousin is a great convenience, if not a necessity, it has lagged in adapting refrigeration as income-producing farm equipment."

Wet Storage Milk Coolers

Results of a recent survey by a state university of wet storage type coolers being used in a highly developed dairying area, cited by the authors, gave the following figures:

"2% of the coolers were being overloaded.

"8% of the coolers were being used at rated capacity.

"90% of the coolers were being underloaded—13% of this group could increase production by 12 or more cans before reaching rated capacity."

In southern areas where dairy farms are small and only a few have the protection of refrigeration, the conditions are much the same, the paper said. Enthusiastic refrigeration equipment dealers have rivaled the above figures in percentages of misfits, but not in the total number of installations, the authors claimed.

"It is apparent from these data," they said, "that salesmen are selling equipment which is too large, or they are rating their equipment too high. These data are not displayed with any idea of condemning local refrigeration dealers of malicious practice.

"On the contrary, it is concluded that the local man has done the best he could. In most cases the local man has usually steered clear of the milk cooler business due to a lack of educational material and encouragement from the manufacturers.

"The problem resolves itself first into the determination of requirements of refrigeration for small dairy farms. But the development of a practical design for a unit which will meet the needs of a large enough group so that the cost of the unit will be reduced to a minimum due to quantity production will be a start in the right direction.

"Incorporation of flexibility as to uses into this design will tend to bring about the same result."

The problem is being attacked on this basis in the Tennessee Valley area by the Agricultural Industries Division of the Tennessee Valley Authority, in cooperation with the Dairy Department of the University of Tennessee and the Agricultural Division of the Tennessee Valley Authority. These agencies hope to hasten a better understanding of the needs of the dairymen of the area by the manufacturers in order to secure the protection of adequate refrigeration for more dairy farms.

The results of the work done by the above agencies have been written into a complete set of specifications for a four 10-gal. can milk cooler. It should be emphasized, it was stated, that the design proposed in the specifications is not claimed to represent perfection, but rather represents a cooler that will give a long period of service at a reasonable cost.

Walk-In Refrigerators

Refrigerated storage of perishable foods on the farms from the time of abundance to the time of relative scarcity greatly reduces food losses and price variations, the authors claimed.

At the same time, they pointed out, the period of normal consumption is greatly extended. The effect of these forces on the farmer-producer is to decrease his cash out-go for food and increase his cash income for products marketed.

In many instances farmers do not have available commercial cold storage facilities either in their community or in the nearby town. Here, the authors declared, farmers have the choice of waiting until a frosty morning to kill the annual meat supply, of storing the milk and butter in the spring water, of storing the fruits and vegetables in the cellar, of using the air from a cave, if luckily they have one, to cool their products, or of having controlled refrigeration in an insulated cooler.

"The use of a mechanically refrigerated cooler is naturally much preferred to the insufficient and ancient methods mentioned above," they said.

The use of large refrigerators or walk-in coolers to keep quantities of farm products, particularly fresh meats, is sure to develop into one of the most profitable adaptations which can be made of mechanical refrigeration on farms, they pointed out.

"Demonstrations of the practicability of such units in typical rural communities have always created interest among the farmers. The present initial high cost of such equipment is seemingly the only barrier that keeps them from wide-spread distribution.

"At present the only units of this type in use are in cases where users have been able to foresee the payment of the cost of their equipment by marketing their products at premium prices."

Community Refrigerating Plants

Practices followed in storing farm products by either commercial or cooperative plants vary greatly throughout the United States and Canada, the authors stated. Development in the various sections has been built around some important product in the area.

For instance, in less than a decade the rural refrigeration interests in the Gulf States have developed a large number of meat curing plants.

The farmer usually kills his hogs on the farm, where the offal, the trimmings, and lard can be easily removed. He then takes the meat to the storage plant, where it is placed in the chilling room and allowed to stay until the temperature has reached 40° F. or below.

The chilling of the carcass arrests the growth of certain bacteria often found in freshly slaughtered hog carcasses. The meat is then removed from the chilling room, cut up, salted, and placed in bins in the storage room. Curing time is approximately 60 days for hams and shoulders.

Meat curing plants generally maintain temperatures from 33° F. to 38° F., they reported, so that even the hams are at 40° F. or lower within 48 hours. Charges for curing the meat are about as follows: Salt curing, 2¢/lb., sugar curing, 2½ to 3¢/lb., and smoke, about ½¢/lb. extra. Since cured meats tend to become rancid in hot weather, the bins are often used throughout the year, or until the meat is removed for consumption.

In the Pacific Northwest where commercial storage of frozen berries is an important industry, the authors found farmers likewise making use of temperatures below freezing for storage.

Most generally, they said, this service is offered to the public by locker systems comparable in many ways to safety deposit boxes in banks. These lockers are used for the storage of meats, largely beef and mutton, berries, beans, peas, and poultry. Relatively long term storage is possible in these plants where the temperatures are well below freezing, generally from 5° F. to 15° F.

In Ontario, Canada, they continued, one corporation has refrigeration service for farmers at Windsor, Chatham, London, Kitchener, and Hamilton.

Typical of this service, they said, is the London plant where the corporation has developed sufficient interest in the five-year period so that it now has approximately 3,000 farm customers. Part of the farmers use the 20x20x24-in. lockers in the 7° F. rooms at $6 per year per locker, or $3.50 for six months per locker. Another portion uses a pound rate at 1¢/lb./90 days. A third group uses the general cold storage, about 32° F., for their produce and eggs.

"That this type of rural refrigeration service is filling a long felt need and want in agricultural America," the authors concluded, "is evidenced by the recent requests of the majority of the states for W.P.A. funds for community refrigeration plants.

"In some states plans are under way for the construction of two score of these refrigeration centers. Had the refrigeration fraternity been fully prepared to extend to these agencies well planned and experimentally supported programs of diversified community storage, both the agriculturalist and manufacturer might have proceeded with much more confidence than is now possible."

Frick Freon System Cools Water, Syrup In Bottling Factory

BALTIMORE—To cool the water and syrups used in the manufacture of beverages, the High Rock Bottling Co., manufacturer of ginger ale and soft drinks, has installed a Frick Freon plant in its factory here.

A cork-insulated, copper-lined tank with six oval bent copper coils, aggregating 1,200 lineal feet, connected to end headers, is the unit for water cooling. Freon is fed directly from the condenser into the bottom header, with electric float and magnetic valve control.

A hand set valve adjusts the expansion. This expansion, in connection with the small diameter of the pipe, creates sufficient velocity in the coils to return all oil to the compressor, and prevents the oil from settling on the low side.

Equipment consists of a 7¾-by-5 Frick Freon compressor and a 16-in. by 15-ft. shell-and-tube condenser. The compressor is operated at 400 r.p.m. by a 25-hp. Century type A. S. motor, with an automatic electric thermostat control from the water in the tank.

Beverage is bottled at the rate of four cases per minute; each case contains two dozen 16-oz. bottles. Water is cooled from 70° to 40° F.

This water is also used in a separate cooling apparatus to cool two gallons of syrup per minute from 85° to 60° F. By cooling the syrup with the new equipment, gas does not generate in the bottles as it did previously when the cold water contacted the warm syrup.

The installation was a project of R. H. Bozman Brothers, of this city. The High Rock Bottling Co. has ordered similar equipment for its Norfolk, Va. plant.

Fogel Equipment Used In Reading, Pa., Market

READING, Pa.—The Otis Shopping Center, one of the largest markets in the state, has installed Fogel refrigeration equipment in the fresh meat department which it recently opened.

Equipment includes five Model 5000 12-foot display cases, a 12-by-12 foot walk-in cooler, back rack, and other accessories.

The cases include the Fogel double air circulation baffle, with a hung coil across the full length of the top of the case. Arrangement of shelves, meat hooks, and other accessories for the interior of the walk-in cooler has been designed to insure complete circulation throughout the box, keeping fresh meats with a forced air system, and eliminating losses.

The cases are operated by a 1½-hp. Frigidaire compressor, and the walk-in cooler by a 1-hp. Frigidaire compressor.

Westinghouse Salesmen Get Computing Device

MANSFIELD—New selling aid for Westinghouse commercial refrigeration dealers and salesmen is the "Simplograph," an estimating device that tells how to determine the B.t.u. load per hour, and the condensing unit and coils that best meet prospects' requirements with regard to reach-in cabinets, walk-in coolers, and display cases.

INFORMAL TALK NUMBER 28

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MASTER SERVICE MANUAL

Chapter 9—Service

Operations for Service Work On Type '2A' Systems

By K. M. Newcum

87. Operations on Type '2A' Systems

Service Operation No. 1:
Evacuating Liquid Line, Evaporator, and Suction Line

As type "2A" system does not have evaporator shut-off service valves Nos. 4 and 5, the liquid line, evaporator, and suction line must all be evacuated at one time. This is accomplished as follows:

a. Close valve 3.

b. Operate compressor until evaporator has completely defrosted and the back pressure is reduced to around 25 in. vacuum.

c. Stop compressor and if vacuum holds at 25 in., the evaporator, liquid line, and suction line are completely evacuated. If the pressure builds up, operate the compressor for another period, or until the vacuum remains constant with the compressor idle.

d. By-pass through valves 6 and 7 on the combination gauge set to increase the pressure in the low side to zero lbs.

e. At 0 lbs. pressure close valves 6 and 7.

f. Close valve 1.

g. The evaporator, liquid line, and suction line are now evacuated and the pressure balanced at 0 lbs., and any or all of these parts may be removed for repairing or replacing.

Note: The liquid temperature valve may tend to retard the evacuation of the liquid line, but in practice it is usually found that it does not seat sufficiently tight to prevent the liquid from passing through during the pump down period.

As a double check at step "c," the liquid temperature valve may be tapped lightly with a screw driver handle to jar it loose. Any liquid passing during this procedure will effect a noticeable increase in pressure on the compound gauge.

Service Operation No. 2:
Purging Air from Liquid Line

a. Loosen liquid line connection at the liquid temperature valve.

b. Crack valve 3.

c. The pressure from the receiver will force the air from the liquid line.

d. When refrigerant is noticed escaping from tube, tighten connection and close valve 3.

Service Operation No. 3:
Purging Air from Evaporator And Suction Line

a. With compressor idle, close valve 1.

b. Loosen suction line connection on valve 1.

c. Open valve 3, and pressure passing liquid temperature valve will force the air from the evaporator and suction line.

d. When refrigerant is noticed escaping from suction line connection, the connection should be tightened and valve 3 closed.

Note: It may be necessary to tap the liquid temperature valve slightly at step "c."

Service Operation No. 4:
Pumping Air from Evaporator And Suction Line

This method is often preferred over purging the air and may be done as follows:

a. Purge liquid line as in operation 2.

b. Close valve 2.

c. Connect purge line to service connection 8, and run to neutralizing solution or outside if SO_2. If isobutane, Freon, or methyl chloride, this is not considered necessary.

d. Open valve 7, and pressure in cylinder head will escape. Close valve 7. Remove purge line.

e. Disconnect gauge set line from connection on valve 2. Connect purge line to this connection.

f. Run open end of purge line into glass bottle.

g. With valve 3 closed and valve 1 open, start compressor and run it at short intervals until highest possible vacuum is reached on compound gauge. This should be 25 in. or more.

h. At this point no more air or refrigerant is being exhausted from the purge line. Disconnect purge line and reinstall line to pressure gauge, while the compressor is still in operation.

i. Open valve 2 to near back seat.

j. By-pass through gauge set to increase low side pressure above 0 lbs. for testing for leaks.

k. Close valves 6 and 7.

Note: The purpose of placing the open end of the purge line in the glass bottle is to catch any oil that may be pumped over during the running period of the compressor. New oil in the exact amount of that collected in the bottle should be added to the system before leaving the job.

Service Operation No. 5:
Testing for Leaks

a. Methods of detecting leaks of refrigerants are given in Chapter 2.

b. All joints and connections should be tested for leaks as soon after replacing or repairing the joint as possible.

c. Pressures equal to or above highest normal operating pressure must exist in the part of the system being tested at the time the test is made.

Operation 4

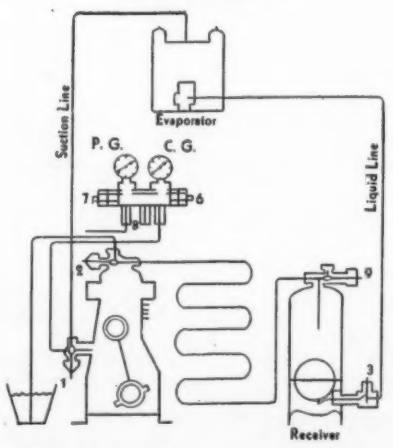

Fig. 146—This sketch shows connections made in purging air from evaporator and suction line.

Operation 6

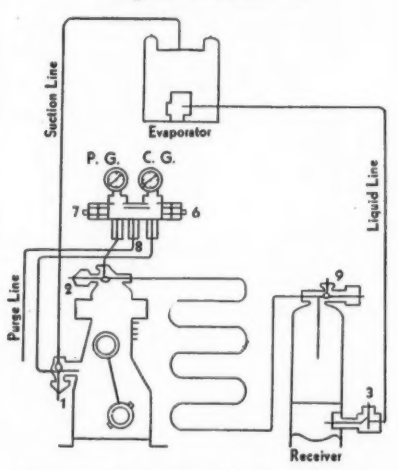

Fig. 147—Connections made in purging air from the condenser of a Type 2A system.

Service Operation No. 6:
Purging Air from Condenser

a. Refer to the affect of air in the system and purging instruction for common refrigerants on page 67 of the INTRODUCTION.

b. Stop compressor and allow condenser to cool to room temperature.

c. Attach purge line to service connection 8. Run open end of purge line to neutralizing solution or open air.

d. Crack valve 7 slightly and purge slowly for several minutes.

e. Observe pressure drop registered on pressure gauge.

f. Purge until normal idle and operating pressures are obtained, then close valve 7 and remove purge line.

Note: As the charge in the high side float system is critical (see page 83 of the INTRODUCTION), there is always a possibility in purging to lower the liquid level in the float chamber to a point where the system is short of refrigerant. More refrigerant may need to be added. Always check the frost line and low side pressure after purging.

Operation 7

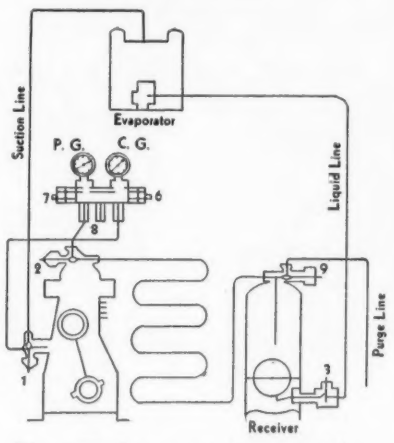

Fig. 148 shows proper connection for purging air from receiver.

Service Operation No. 7:
Purging Air from the Liquid Receiver (Float Chamber)

The affect of air in the top of the liquid receiver is described on page 83 and also in service complaint No. 2.

a. Connect purge line to connection in valve 9.

b. With compressor idle, crack valve 9 and purge, noting any pressure drag in pressure gauge.

c. When purging is completed, close valve 9 and remove purge line.

Service Operation No. 8:
Adding Refrigerant to Low Side

a. Attach charging line from refrigerant cylinder to service connection 8.

b. Purge charging line.

c. Open cylinder valve.

d. Close valve 1.

e. Crack valve 6. Put compressor into operation, using valve 6 as a throttle valve.

f. Charge small quantities at a time. Close valve 6 and open valve 7 at regular intervals, noting operating pressures and frost line on evaporator, to determine when sufficient refrigerant has been added.

g. When sufficient has been added, close cylinder valve. Open valve 6. Close valve 1 and allow compressor to draw pressure from charging line and combination gauge set to 0 lbs. Then close valve 6 and open valve 1.

h. Remove charging line.

Operation 8

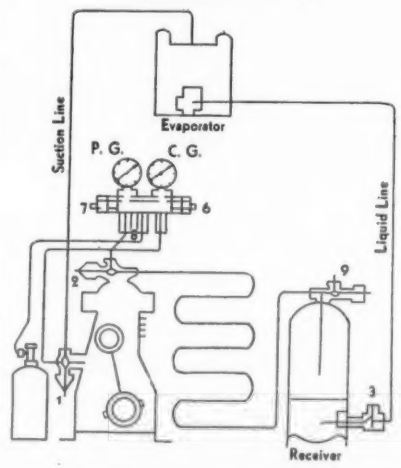

Fig. 149—Setup of equipment for adding refrigerant.

Summary of Instalments Published Previously

A summary of previous instalments of the Master Service Manual follows:

Chapter 1—Theory of Refrigeration (April 10).

Chapter 2—Principles of Mechanical Refrigeration (April 17).

Chapter 3—Common Refrigerants (April 24).

Chapter 4—Condensing Units.

May 1—Description of compressor parts.
May 8—Stuffing box seals, flywheels, and direct-connected units.
May 29—Rotary compressors.
June 5—Care and servicing of shut-off valves and gaskets.
June 12—Condensers.
June 19—Liquid receivers.

Chapter 5—Evaporators.

June 26—Flooded evaporators with low side float valve.
July 3—High side float valves and flooded evaporators.
July 10—Automatic expansion valves.
July 17—Automatic expansion valves—continued.
July 24—Thermostatic expansion valves.

Chapter 6—Controls.

July 31—Low pressure controls.
Aug. 7—Low pressure controls—continued.
Aug. 14—Thermostatic controls.
Aug. 31—Thermostatic controls—continued.

Chapter 7—Motors.

Aug. 28—Repulsion start-induction run motors.
Sept. 4—Repulsion start-induction run motors (continued) and capacitor motors.
Sept. 11—Direct current motors and belts.

Chapter 8—Installation.

Sept. 18—Installation of refrigerators.
Sept. 25—Correct use of fittings in making joints.

Chapter 9—Service.

Oct. 16—Classification of systems and use of combination gauge set.
Oct. 23—Service complaints and remedies on Type 1A flooded systems.
Oct. 30—Service complaints and remedies on Type 1A flooded systems—continued.
Nov. 6—Service operations on Type 1A flooded systems.
Nov. 13—Service operations on Type 1A flooded systems—continued.
Nov. 20—Service Operations on Type 1A flooded systems—concluded.
Nov. 27—Service complaints and operations on Type 1B and 1C flooded systems.
Dec. 4—Service operations on Type 1D and complaints on Type 2A systems.
Dec. 11—Service operations on Type 2A flooded systems

BUYER'S GUIDE

MANUFACTURERS SPECIALIZING IN SERVICE TO THE REFRIGERATION INDUSTRY

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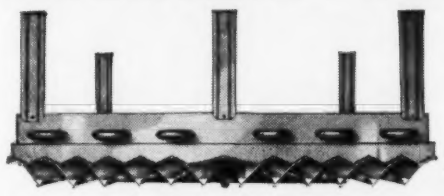

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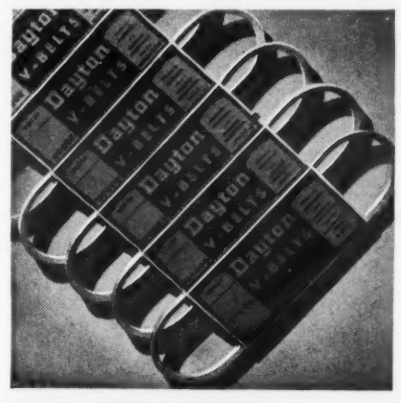

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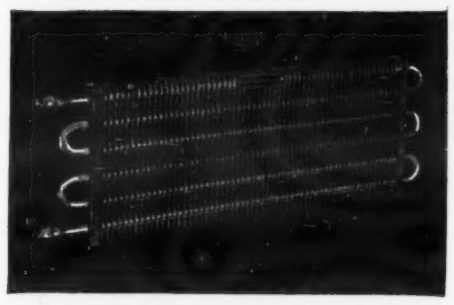

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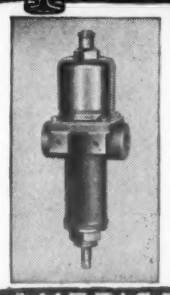

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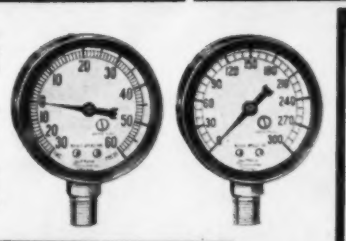
When so ordered Marsh refrigeration gauges can be supplied with zero adjustment feature (patent pending) assuring perfect accuracy at every reading of the instrument.



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HARDY "Mayflower" Compressors

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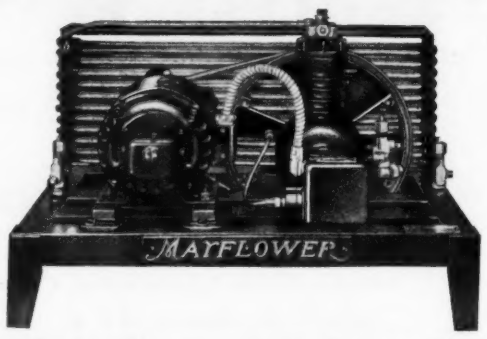
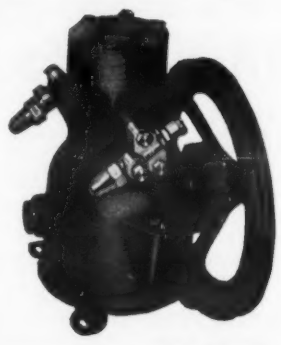
For dependability and genuine satisfaction, dealers are recommending this equipment



HARDY MANUFACTURING CO., Inc., 100 Davis Ave., Dayton, Ohio



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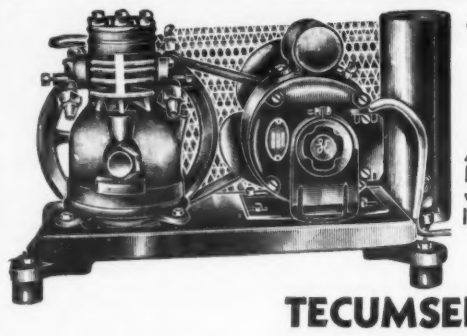

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All bearings diamond bored. Positive lubrication of piston by newly developed process plus forced feed lubrication in all models.

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All types and sizes of heavily insulated refrigerators and display cases.

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Thoroughly reinforced all steel attractively finished cabinets.

Different models of varying capacities.

Write for details and sales prices.

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PATENTS

Issued Nov. 26, 1935

2,022,727. CORK INSULATION. Louis R. Lee, Rohrerstown, Pa., assignor to Armstrong Cork Co., Lancaster, Pa., a corporation of Pennsylvania. Application Nov. 9, 1931. Serial No. 573,834. 5 Claims. (Cl. 154—44.)

2,022,740. AIR CONDITIONING DEVICE. Ira W. Rowell, Hermansville, Mich. Application Sept. 12, 1932. Serial No. 632,670. 2 Claims. (Cl. 261—105.)

2,022,764. REFRIGERATING APPARATUS. J. Lowell Gibson and Wynne G. Winkler, Dayton, Ohio, assignors, by mesne assignments, to General Motors Corp., a corporation of Delaware. Application Oct. 13, 1931. Serial No. 568,594. Renewed March 17, 1934. 13 Claims. (Cl. 62—4.)

2,022,771. REFRIGERATING APPARATUS. James R. Killen, Dayton, Ohio, assignor, by mesne assignments, to General Motors Corp., a corporation of Delaware. Application Oct. 13, 1931. Serial No. 568,636. 12 Claims. (Cl. 62—4.)

2,022,774. REFRIGERATING APPARATUS. Andrew A. Kucher, Dayton, Ohio, assignor to General Motors Corp., Dayton, Ohio, a corporation of Delaware. Application Dec. 29, 1934. Serial No. 759,761. 6 Claims. (Cl. 62—115.)

2,022,787. REFRIGERATING APPARATUS. Harry F. Smith, Dayton, Ohio, assignor, by mesne assignments to General Motors Corp., a corporation of Delaware. Application April 14, 1933. Serial No. 666,159. 13 Claims. (Cl. 62—141.)

2,022,905. THERMOSTATIC PISTON. Alfred Vang and John A. Kienle, Detroit, Mich., assignors of one-third to Herbert B. Trix, Detroit, Mich. Application May 25, 1934. Serial No. 727,426. 21 Claims. (Cl. 309—11.)

2,023,069. LIQUID REFRIGERATING UNIT. Matthew P. Fugle, Oak Park, Ill., assignor of one-half to Larkin Refrigerating Corp., Atlanta, Ga., a corporation of Georgia. Application Oct. 22, 1934. Serial No. 749,392. 13 Claims. (Cl. 62—101.)

2,023,088. INTERMITTENT COOLING SYSTEM. Carl Georg Munters, Stockholm, Sweden, assignor, by mesne assignments, to Servel, Inc., Dover, Del., a corporation of Delaware. Application Feb. 9, 1933. Serial No. 655,881. 6 Claims. (Cl. 62—118.)

2,023,089. REFRIGERATION. Carl Georg Munters, Stockholm, Sweden, assignor, by mesne assignments, to Servel, Inc., Dover, Del., a corporation of Delaware. Original application Feb. 9, 1933. Serial No. 655,881. Divided and this application July 18, 1934. Serial No. 735,776. In Germany March 14, 1932. 17 Claims. (Cl. 62—118.)

2,023,201. EVAPORATOR FOR REFRIGERATORS. Stephen L. Ingersoll, Chicago, Ill., assignor, by mesne assignments, to Borg-Warner Corp., Chicago, Ill., a corporation of Illinois. Application Sept. 29, 1932. Serial No. 635,386. 9 Claims. (Cl. 62—126.)

2,023,206. SHAFT SEAL CONSTRUCTION. John A. Olson, Cleveland, Ohio, assignor to Ruth M. Olson, Cleveland, Ohio. Application May 20, 1933. Serial No. 672,012. 3 Claims. (Cl. 286—7.)

2,023,241. OIL SEPARATOR FOR REFRIGERATING SYSTEMS. Albert A. Ralston, Fort Wayne, Ind., assignor to General Electric Co., a corporation of New York. Application Feb. 1, 1934. Serial No. 709,307. 5 Claims. (Cl. 62—115.)

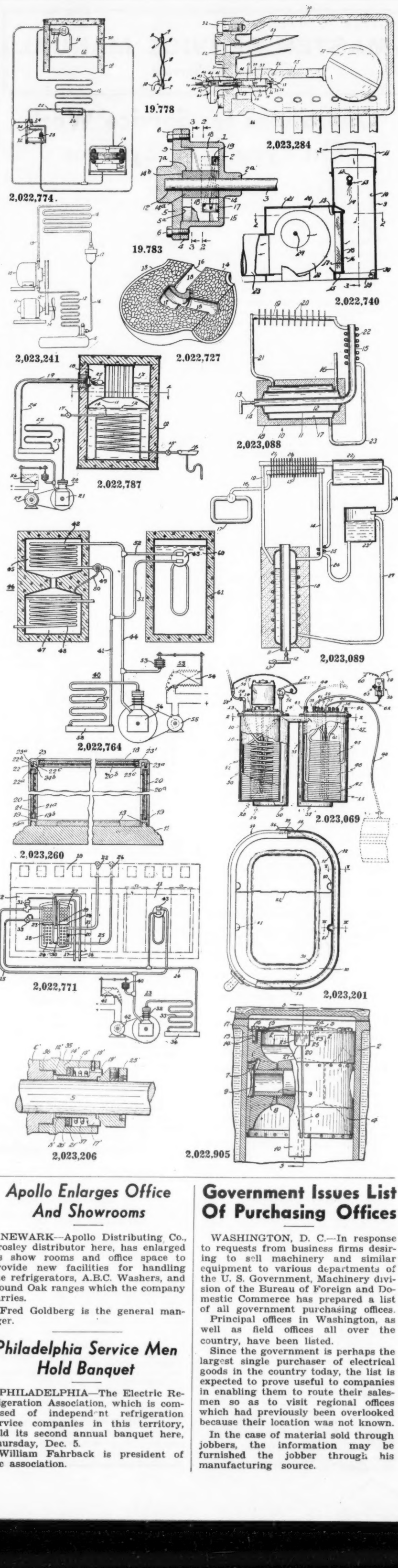
2,023,260. DISPLAY CASE. Harry F. Beers, Pelham, and Jacob W. Shrope, New York, N. Y.; said Shrope assignor to said Beers. Application Sept. 29, 1932. Serial No. 635,336. 7 Claims. (Cl. 312—114.)

2,023,284. REFRIGERATING APPARATUS. Robert G. Osborn, Dayton, Ohio, assignor, by mesne assignments, to General Motors Corp., a corporation of Delaware. Application Jan. 31, 1927. Serial No. 164,750. Renewed May 24, 1930. 4 Claims. (Cl. 137—104.)

REISSUES

19,778. METHOD OF MAKING EVAPORATORS. Thomas L. Litle, Jr., Birmingham, Mich., assignor, by mesne assignments, to Copeland Refrigeration Corp., Mount Clemens, Mich., a corporation of Michigan. Original application May 8, 1926. Serial No. 107,568. Patent No. 1,712,085, dated May 7, 1929. Divided and application April 10, 1929. Serial No. 353,911. Patent No. 1,779,911, dated Oct. 28, 1930. Application for reissue June 6, 1932. Serial No. 615,737. 10 Claims. (Cl. 113—118.)

19,783. COMPRESSOR. George E. Roberts, Burbank, Calif., assignor of one-fourth to Rudolph A. Riek and one-fourth to Forest O. Riek, both of Rhinelander, Wis. Original No. 1,913,207, dated Oct. 17, 1933, Serial No. 613,735, May 26, 1932. Application for reissue Aug. 13, 1934. Serial No. 739,707. 3 Claims. (Cl. 103—139.)



Stevens Hotel Installs Leonards in Apts.

CHICAGO—When the Stevens hotel recently converted its eighteenth floor into one-, two-, and three-room apartments, Leonard electric refrigerators were installed as standard equipment. The order for the Leonards was received by L. C. Wiswell Co., local Leonard distributor. Otto K. Eitel is manager of the hotel.

Apollo Enlarges Office And Showrooms

NEWARK—Apollo Distributing Co., Crosley distributor here, has enlarged its show rooms and office space to provide new facilities for handling the refrigerators, A.B.C. Washers, and Round Oak ranges which the company carries.

Fred Goldberg is the general manager.

Philadelphia Service Men Hold Banquet

PHILADELPHIA—The Electric Refrigeration Association, which is composed of independent refrigeration service companies in this territory, held its second annual banquet here, Thursday, Dec. 5.

William Fahrback is president of the association.

Government Issues List Of Purchasing Offices

WASHINGTON, D. C.—In response to requests from business firms desiring to sell machinery and similar equipment to various departments of the U. S. Government, Machinery division of the Bureau of Foreign and Domestic Commerce has prepared a list of all government purchasing offices.

Principal offices in Washington, as well as field offices all over the country, have been listed.

Since the government is perhaps the largest single purchaser of electrical goods in the country today, the list is expected to prove useful to companies in enabling them to route their salesmen so as to visit regional offices which had previously been overlooked because their location was not known.

In the case of material sold through jobbers, the information may be furnished the jobber through his manufacturing source.

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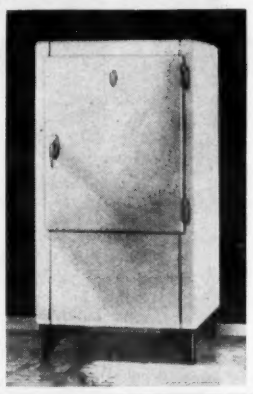
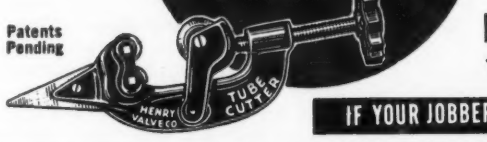


HENRY

TUBE CUTTER WITH STEEL ROLLERS IN TUBE SUPPORT



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Vol. 10—Sept. 6 to Dec. 27, 1933. (Serial Nos. 233 to 249.)
Vol. 11—Jan. 3 to April 25, 1934. (Serial Nos. 250 to 266.)
Vol. 12—May 2 to Aug. 29, 1934. (Serial Nos. 267 to 284.)
Vol. 13—Sept. 5 to Dec. 26, 1934. (Serial Nos. 285 to 301.)
Vol. 14—Jan. 2 to April 24, 1935. (Serial Nos. 302 to 318.)
Vol. 15—May 1 to Aug. 28, 1935. (Serial Nos. 319 to 336.)

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1935 Refrigeration and Air Conditioning Directory or 1935 Refrigeration and Air Conditioning Market Data Book or Master Electric Refrigeration Service Manual (to be published Jan. 1, 1936)		
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Name .....

Attention or In care of .....

Street .....

City ..... State .....

Remarks .....
(Please indicate products sold or principal line of business.) 12-11-35

QUESTIONS

1935 Sales Figures

No. 2594 (Utility, California)—"Please furnish your estimate on domestic refrigerator sales for 1935, both for units and dollar volume. If possible, also send us the same figures for 1935 estimate on ranges, washers, and ironers. Please wire reply."

Answer: Our latest estimate for the first 10 months of 1935 show sales of 1,586,242. Estimated dollar volume is $282,350,076, using the 1934 average of $178 per unit retail price.

We do not have the other figures you request.

Rubber Ice Trays

No. 2595 (Dealer, New Jersey)—"Can you advise us the name of the manufacturer or manufacturers of the rubber ice cube trays?"

Answer: Rubber ice trays for household electric refrigerators are manufactured by the Inland Mfg. Co., 15 Coleman Ave., Dayton, Ohio.

Data on Butane

No. 2596 (Reader, California—"Please send me a copy of your magazine, dated Dec. 30, 1931, containing a report of tests on refrigerants. In case you do not have a copy, maybe you could tell me of some other place where I could get hold of a copy.

"Also, I would like to get a list of books and magazines about air conditioning, electric refrigeration, and butane.

"This butane is a refrigerant, but also a fuel, and used for refining."

Answer: Our subscription department is forwarding a copy of ELECTRIC REFRIGERATION NEWS for Dec. 30, 1931, containing the report of tests on refrigerants.

Regarding your request for a list of books and magazines about air conditioning and electric refrigeration, we have not published any books on air conditioning, but a good deal of timely information on the subject is published in the weekly issues of ELECTRIC REFRIGERATION NEWS.

ELECTRIC REFRIGERATION NEWS is the weekly newspaper of both the refrigeration and air-conditioning industries. Every issue contains considerable air-conditioning information, with one issue each month devoted especially to the subject. These special issues report news of interesting installations and new developments in the field, as well as engineering, statistical, and service data.

Butane is no longer commonly used as a refrigerant. For information as to its properties you might consult the *Refrigerating Data Book*, published by the American Society of Refrigerating Engineers.

Properties of butane are also briefly described in *Refrigeration*, by Moyer and Fittz, published by McGraw-Hill Book Co., and in the volume on Noxious Gases by Henderson and Haggard.

Another book which should prove of value to you is our MASTER SERVICE MANUAL, which will be off the press about Jan. 1. This volume will consist principally of the series of articles by K. M. Newcum, published in the weekly issues of ELECTRIC REFRIGERATION NEWS beginning April 10, 1935, supplemented by additional related material, and making available detailed information on the design and operation of present-day refrigeration systems.

Refrigeration Codes

No. 2597 (Distributor, Iowa)—"Kindly advise us if you have copies of the different codes in effect in several different cities, such as Chicago, New York, Detroit, etc.

"Would appreciate same, or it might be that you could advise us where we would be able to get this information, as we are very much interested in a code on refrigeration work here."

Answer: The code for New York City is being revised, and hearings are being held on it at the present time. In the Nov. 13 issue of ELECTRIC REFRIGERATION NEWS, we published the code on which the present hearing is being conducted.

This week's issue contains a story on the first hearing, and later hearings will be covered in future issues.

Air-Conditioning Directory

No. 2598 (Consulting engineer, Pennsylvania)—"Have you included in any recent issues of ELECTRIC REFRIGERATION NEWS an air-conditioning directory, classified by functions, similar to the one you published in 1933?

"We are interested in air conditioning, especially unit room conditioners, and while we have a considerable amount of data on this subject, we would like to bring our files down to date."

Answer: This year the data on air-conditioning equipment was published in the form of specifications in the May 22 issue of ELECTRIC REFRIGERATION NEWS. These specifications give the functions of each conditioner.

In the 1935 REFRIGERATION AND AIR CONDITIONING DIRECTORY is given a complete list of all manufacturers of air-conditioning equipment. This list is divided into all-season, summer systems, and winter systems.

Back issues of the NEWS are obtainable at a cost of 10 cents per copy, and the price of the DIRECTORY is $3.

Refrigerators in Use

No. 2599 (Dealer, Louisiana)—"Telegraph the total number of household electric refrigerators now in use in the United States."

Answer: Approximately 7,000,000 refrigerators are estimated as being in use now in the United States.

Directory & Data Book

No. 2600 (Newspaper, Illinois)—"Will you kindly inform us as to when the 1935 REFRIGERATION AND AIR CONDITIONING DIRECTORY and the 1935 REFRIGERATION AND AIR CONDITIONING MARKET DATA BOOK will be published?"

Answer: The 1935 REFRIGERATION AND AIR CONDITIONING DIRECTORY was published in March, 1935, and the MARKET DATA BOOK in June. Both of these volumes are available at $3 each.

The next edition of the DIRECTORY will be available about July 1, 1936, and the MARKET DATA BOOK about Sept. 1, 1936.

Refrigerant Specifications

No. 2601 (Reader, Ohio)—"Enclosed is 10 cents for the back issue of the ELECTRIC REFRIGERATION NEWS that was published with the specifications of refrigerants for different kinds of electric refrigerators."

Answer: Specifications of refrigerants for the various types of household electric refrigerators were included in the general specifications published in the March 20 issue of ELECTRIC REFRIGERATION NEWS. Specifications of air-conditioning equipment were published in the March 27 issue, and of commercial condensing units in the April 3 issue.

Our supply of these issues is exhausted. However, we will publish REFRIGERATION AND AIR CONDITIONING SPECIFICATIONS, Volume 4 of the Refrigeration Library, on March 1, 1936. This volume will include 1936 specifications, as well as those covering previously manufactured machines, and will list specifications of orphan refrigerators as well as those produced by active manufacturers. Price of the book will be $3.

Complicated Problem

No. 2602 (Distributor, Wisconsin)—"We have recently run up against a problem of furnishing a sprayer type cooling installation. This system uses an ice water spray as a cooling medium, and is something entirely new to us, and we are looking for the manufacturer of spray heads for this type of installation.

"If you are in a position to refer us to a manufacturer who manufactures part or parts of this type of installation, we certainly would be very thankful.

"Also, if you are acquainted with this type of installation, you may undoubtedly be in a position to estimate the refrigeration load imposed upon a cooler 20 ft. wide by 20 ft. deep by 18 ft. high, in which 10,000 lbs. of freshly slaughtered meat is put daily. This meat has a body temperature of approximately 95°, and must be chilled to 35° in 24 hours.

"If you are able to quote on a refrigeration load also advise what temperature the ice water would necessarily have to be held at, figuring a 4,000-gallon tank.

"The layout of this system is that the ice water is circulated through the cooler and emitted through a series of spray heads and the spray drops on a large drainboard, draining it back by gravity to the tank. The intention of this installation is to be the utmost amount of humidity with the most efficiency in operation.

"If you can be of any material help to us on this installation, we certainly would feel very grateful to you."

Answer: The following companies manufacture water spray nozzles:

Binks Mfg. Co.
3114 Carroll Ave., Chicago, Ill.
Buffalo Forge Co.
490 Broadway, Buffalo, N. Y.
Imperial Brass Mfg. Co.
564 S. Racine Ave., Chicago, Ill.
Jos. A. Martocello & Co.
229 N. 13th St., Philadelphia, Pa.

It is our understanding that a temperature of 35° F. cannot be obtained with an ice water spray system and that it would be necessary for you to use either brine coils or a direct expansion refrigerant system to secure the desired results.

We advise you to call in an experienced refrigerating engineer to handel this problem since it involves a number of unusual factors and cannot be solved by rule-of-thumb methods.

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PAYMENT in advance is required for advertising in this column.

REPLIES to advertisements with Box No. should be addressed to Electric Refrigeration News, 5229 Cass Ave., Detroit, Mich.

POSITIONS AVAILABLE

SALESMEN in the different commercial centers of the country to sell The Reeves Unit Cooler to Refrigeration Dealers. This cooler has been introduced in New England during the past two years with wonderful success. It is designed solely for use in Market and Food refrigerators and is entirely different from any other cooler. Prefer men now calling on refrigeration dealers, and we offer liberal commission. If you reply give complete details and reference. The Reeves Engineering Co., Milford, Conn.

POSITIONS AVAILABLE

SALES ENGINEER
A PROMINENT MANUFACTURER

of automatic control equipment has several openings for sales engineers. Previous University training or experience in Air Conditioning and heating, and an acquaintanceship with architects and engineers is essential. Address Box No. 748, care of Electric Refrigeration News.

FRANCHISE WANTED

MONTREAL manufacturer's representative desires to represent in Quebec, reputable and responsible manufacturers of refrigeration parts and kindred accessories. Have established connections amongst refrigeration manufacturers, dealers and service men. At present representing Rotary Seals and Cutler Hammer Controls. Willing to purchase and maintain working stock for efficient service. Modern Household Appliances, Ltd., 1106 Beaver Hall Hill, Montreal.

SALESMAN now representing large manufacturer and well acquainted all jobbers in Southwest seeks additional strong line replacement parts or accessories for refrigeration supply and kindred jobbers. Complete coverage of this large area can be secured quickly and profitably. Dallas warehouse and complete factory branch facilities available. Box 747, Electric Refrigeration News.

EQUIPMENT FOR SALE

MANUFACTURERS OVERSTOCK: New six hole double ice cream cabinets, stainless tops, portable or remote control. Quantity limited. Priced at $55.00 for quick disposal. ⅓ HP new Servel units for above at $40.00 less motor. Extra special, 1 HP Frigidaire, rebuilt and guaranteed, $95.00. Send for bargain list of new coils. Pioneer Refrigeration Equipment Co., 33 Warren St., New York City.

SERVICE MEN WANTED

NATIONAL Sales Organization, selling electric water coolers and drinking fountains combined, and electric refrigeration, desires contacts with service organizations in every locality in the United States. Write stating qualifications, and prices for service, to L. K. McDorman, 613 Fifteenth St., N.W., Washington, D. C.

HERMETIC UNITS REPAIRED

GENERAL ELECTRIC SEALED UNITS—repaired, rebuilt, exchanged. Guaranteed service. Our modern shop is especially equipped to efficiently repair these units. Prices low and workmanship the best. Give model number when writing. Immediate service. Rex Refrigeration Service, 446 East 79th St., Chicago.

PATENTS

HAVE YOUR patent work done by a specialist. I have had more than 25 years' experience in refrigeration engineering. Prompt searches and reports. Reasonable fees. H. R. Van Deventer (ASRE), Patent Attorney, 342 Madison Avenue, New York City.

REPAIRS

HALECTRIC control repair service. All makes thermostatic and pressure controls rebuilt. Automatic and thermostatic expansion valves repaired. Refrigerant gases carried in stock for rush shipment. Warrenoil for stuck-up compressors. Rebuilt American Radiator Mercoid controls similar to No. 848, five dollars each. Halectric Laboratory, 1793 Lakeview Rd., Cleveland, Ohio.

SCHOOLS

REFRIGERATION-AIR CONDITIONING. Learn installation, servicing, estimating and engineering sales in a resident school. Modern class rooms, competent instructors, well equipped laboratories with domestic and commercial refrigeration and air conditioning equipment for students to work on. Thorough, practical training. Detroit School of Refrigeration, 6517-6519 Grand River Ave., Detroit, Mich.

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